The IFAC Story

The International Federation of Automatic Control

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PREFACE

Although many scientific developments were conducted in the 1950s, there was relatively little global sharing of technical results, especially across national borders. Individuals, as well as small groups, in universities and corporate settings throughout the world were conducting research, yet a myriad of restrictions were in place, and did not encourage the sharing of ideas. Travel was expensive and only a few journals existed, especially in the applied science and engineering disciplines. Many corporate laboratories had been dedicated to wartime demands, with quite some government secrecy, which did not exactly encourage wide sharing of ideas.

The control and systems community was particularly active in the last half of the twentieth century, with early stimulation coming from wartime needs, and developments progressing in the areas of fire control, precision bombing, and trajectory analysis. Major challenges existed in process control, manufacturing, and electronics. Control is a hybrid field combining scientific, mathematical, and engineering subject matter. The newly created international professional organization, the International Federation of Automatic Control (IFAC), bridged these established technical areas of research and development.

There have been comprehensive examinations of the control field in numerous papers and books but professional documentation of this emergence was lacking. Thus we find ourselves in the first part of the twenty-first century without the story of how IFAC came to be and developed into the organization it is today. The diversity of IFAC's members, are national societies (National Member Organizations - NMOs) in a variety of forms, with each NMO's story quite different from one country to the next. The models of national membership are almost as varied as the countries represented in the IFAC General Assembly.

After the year 2000, an increased competition to host the World Congress could be observed. The World Congress is a triennial event within IFAC, and various NMOs recognize the value in describing their local national story for the wider IFAC community. It was in preparation for IFAC's 50th anniversary that such NMO histories were solicited as part of that anniversary celebration. A number of NMO histories have been prepared and are available either online or at the individual offices of the NMOs. More about this may be found in Chapter II of this book.

The IFAC Story

The 21st IFAC President Janan Zaytoon of France, made the decision in 2014 that leading up to the 60th IFAC Anniversary at the IFAC World Congress in Toulouse in 2017, there should be a more substantial focus on the history of IFAC. He encouraged Emeritus Professor Stephen Kahne of the United States to prepare the first comprehensive history of IFAC and

initiate a permanent focus on the history of this Federation into the future. Kahne is an IFAC Advisor and had been IFAC President in the 1993-1996 term ending with the IFAC World Congress in San Francisco. He assembled a team of IFAC Advisors and other experienced IFAC leaders to prepare what you see here in time for the Toulouse Congress. The e-book format of this material is being used to encourage updates and additions to this document and to allow linkages to developing programs and new materials as they become available. NMOs that choose to improve their own stories of their creation can readily replace the brief histories contained in this version of "The IFAC Story" or augment what is written.

The text is organized as follows. Following this brief introductory statement Chapter I is the chronological story of how IFAC came to be and over the years what it has accomplished. Since the executive agencies of IFAC are its General Assembly and its Council (initially known as the Executive Council) supported by boards and committees, the minutes of these various groups are the original source materials for much of this chapter. There are a few surviving individuals whose memories have been helpful in expanding on some of the documented information. Unfortunately there are a few gaps in the written materials that have not been located and recollections of "old timers" have been helpful to fill in some of these blanks. Although the authors have tried to use only documented research materials, it is possible that a few "recollections" that could be proven wrong in the future, may have been included in the text.

It is also appropriate to note that some of the text in the first two chapters is taken verbatim from numerous reports of meetings and activities at different times and so are written in different styles. If one were to read this book from cover to cover, this change of styles may be disconcerting. However, the expectation is that this book will be read in parts based on the reader's interest in certain topics, certain timeframes or events and people, and therefore not be concerned with the stylistic differences throughout.

A Living Document

Each future triennium will see an additional section within the Narrative (Chapter I), to continue the story in perpetuity. The IFAC Secretariat will welcome suggestions for additional contributions at any time and a peer review process will be put in place to allow the continuation to occur. Any errors in the electronic document can easily be corrected. The publication philosophy is to use materials directly (with some minor editing) from NMOs and TCs. If the content is already online within the IFAC website, a link to the IFAC Secretariat will act as a pointer to either electronic archives or to scannable hardcopy archives in the Secretariat. Known URLs and resources will be linked. Examples of this are the extensive NMO histories produced by several NMOs, which may have been distributed in printed form, often in preparation for a future World Congress bid.

This document is meant to be the foundation of a permanent IFAC history effort. Readers are encouraged to point out any errors or omissions to the IFAC Secretariat. The majority of text of the book is original material derived from meeting minutes and other sources that resulted in "The IFAC Story". Most TCs want to maintain their own web presence and direct links are preferred, rather than reproducing that material in this book. Attempts are made not to reproduce materials readily available from the IFAC Secretariat.

The Team

Making this publication happen has been a team effort. Professor **Stephen Kahne** spearheaded "The Control History Task Force", for writing the initial version of this document. In addition to overseeing the project, Kahne is largely responsible for writing the Narrative Chapter (Chapter I) and the "Facts & Figures" (Chapter V).

Professor **Sarah Spurgeon** of the University College London in Great Britain is a current member of the IFAC Council, and contributed by requesting and collecting NMO histories that comprise much of Chapter II and Chapter V, on IFAC's National Member Organizations.

IFAC Advisor and Past Vice President **Lennart Ljung**, Professor Emeritus at Linkoping University in Sweden, wrote Chapter III, about the IFAC Technical Board, and its predecessor organizations within IFAC.

IFAC Advisor and Emeritus Professor at George Mason University in the US, **Janos Gertler**, contributed Chapter IV, about IFAC Publications.

A portion of Chapter I deals with the triennial IFAC Congresses, and was coordinated and partially written by IFAC Council Member Professor **Dong-Il Cho** of Seoul National University in the Republic of Korea.

Descriptions of each of the IFAC Congresses from 1960 through 1993 were originally written by **Professor Kahne** and published in the IEEE Control Systems Magazine in 1996. They are reprinted here with permission of the IEEE.

Reports of the Congresses since 1993 were collected from the various NMOs by **Professor Cho**.

IFAC Advisor and former IFAC President (2002-2005) **Vladimir Kucera** of the Czech Technical University in Prague, assembled the biographies of all IFAC Presidents, and coordinated the work of the history task force with organizers of the 2017 IFAC Congress in Toulouse.

Preparation of the IFAC Presidents biographies was greatly facilitated by the 2011-2014 IFAC President **Ian Craig** of South Africa, and were used as text for lecture hall identification posters at the 2014 World Congress in Cape Town South Africa.

IFAC Vice President and Chairman of the Executive Board **Sergio Bittanti** of Italy during the 2014-2017 term, helped coordinate the project with the 2014-2017 IFAC leadership team.

An additional member of the task force was Professor **Shinji Hara** of the University of Tokyo in Japan.

Professor **Bozenna Pasik-Duncan** of the University of Kansas, contributed the article in Chapter V on education initiatives in IFAC. Her contributions to IFAC are numerous, and she also created and has been responsible for pre-college student workshops at many IFAC Congresses and technical meetings of other scientific societies.

The writing team is very pleased to thank numerous members of the IFAC community for the countless suggestions and sources of data that have proven helpful in telling this story. We have chosen not to include many anecdotes and first person experiences to keep the length of the project within reasonable limits but hope that reading this book will encourage others to relate their own stories in appropriate blogs, lecture comments, books, and social events at the hundreds of IFAC technical events in the future. IFAC's ever growing social media presence is another venue for continuing to document IFAC's story.

The IFAC Secretariat in Laxenberg, staffed by **Elske Haberl** and **Katharina Willixhofer**, has been extremely helpful in tracking down source material and digitizing thousands of pages of archival minutes of meetings and other valuable documents. Anita Scheelings in the United States did extensive editorial work and graphic design.

The Goal

Our goal has been to tell the story of this scientific federation, in a way that is interesting to the reader, and of value to the community of professional historians, as well as the current generation of contributors to the control and systems field. When young scientists and engineers embark on careers in a field with such importance to society, it is necessary to gain a sense of how it was before, and on whose shoulders this new generation stands.

Stephen Kahne
June 2017

Chapter I

Narrative

The history of a professional scientific society devoted to the field of control systems

The purpose of this document is to record the history of a professional scientific society devoted to the field of control systems. As of this writing, the society is 60 years old. The International Federation of Automatic Control was created in the late 1950s and has paralleled the field of automatic control.

There are several existing publications that review the foundation upon which IFAC was built. Readers can find guidance in two books by author Stuart Bennett in a special volume of Scientific American in 1952, and in the 2014 article by K. Astrom and P.R. Kumar in the IFAC Journal AUTOMATICA.

Another valuable resource on development of control science and technology can be found in a 2007 special issue of the European Journal of Control.

The overall narrative in this book is generally presented in chronological order. IFAC's development is discussed based on the recorded minutes of its policy making group, initially called the IFAC Executive Council, and later, the IFAC Council. There are links to presidential pictures and brief biographies and to summaries of each of the IFAC Congresses Succeeding chapters discuss some of the IFAC National Member Organizations, evolution of IFAC's technical structure, a 40-year history of IFAC's publications program, and several brief sections on special events and related activities.

The founders of IFAC realized there was a need for a worldwide professional society in the control field and were especially influenced by three conferences. One took place in 1951 in Cranfield mostly involving specialists from the United Kingdom, a second in 1956 in Milano with a largely Italian attendance of 1061 participants, and the third, in Heidelberg., This latter conference attracted 772 people and included most of the core group that eventually founded IFAC. In the years after the war it became clear there were a lot of overlapping conferences covering the same information. As noted by Chestnut the time was right for what became known as IFAC.

The first meeting of the IFAC Executive Council (EC) occurred in Zurich in 1958. Identifying this meeting as an Executive Council meeting might be a bit misleading since up to this point there was no approved Constitution or By Laws in existence. A draft document was circulat-

ed and refined but not actually approved until 1959. However, this draft, prior to its approval must have served as an early guide for actions by the initial leadership.

The supreme body of IFAC was to be called the General Assembly (GA) consisting of delegates having one vote from each National Member Organization (NMO). An NMO was to be a single national group representing the interests of the entire control community within a single country. In some cases such a group already existed at the time this idea of an international federation was considered and in other cases a new national organization had to be created to serve as the NMO. IFAC's executive group was called the Executive Council (EC). The officers were the Past-President, President, First Vice-President, Second VP, Treasurer, and Secretary. Elections for all but the Treasurer and Past President were for two-year terms with no sequential re-election of the President and Vice Presidents. The Treasurer was allowed unlimited sequential re-election for two-year terms. The GA was the body that elected the officers. There was some flexibility permitting a few additional months in office in case the GA meeting time did not match the two-year limit of officer terms. Selection of the Secretary was more complicated as will be described later. In addition to these officers there were six ordinary members of the EC. These ordinary members typically served two 2-year terms and were to be geographically distributed so that not more than one ordinary member could be elected from any one NMO.

The Secretary of IFAC, who was to be an officer, had to be chosen in an unusual manner partly due to the geopolitical realities of the time. In order to ensure full international representation in the newly formed federation in the late 1950s the balance between East and West was required to be an important founding principle. Although IFAC was committed to having no political or economic ambitions, it was necessary to be sensitive to existing political realities. This was one of the primary factors leading to the creation of IFAC as a federation of NMOs rather than a federation whose members were individuals. Each NMO could retain or create an appropriate national structure consistent with its own national restrictions, while having each such NMO as a single entity member of the IFAC General Assembly. This had important implications for all executive positions and the IFAC Secretary position in particular.

Since it was desired that officers, Executive Council members and General Assembly members come from the widest spectrum of countries, it was decided that all officers would be from different nations. All ordinary members of the Executive Council, as well as all General Assembly votes were to be from different countries. Furthermore, the General Assembly itself was to be the supreme body of the federation. In that role, the NMOs, each of which had one General Assembly vote, had ultimate authority for selection of officers and, in fact, had veto power over Executive Council members from their own country. There were two initial issues affected by this structure.

The IFAC founding group was somewhat of an ad hoc group of contributors who happened to be at the 1956 Heidelberg meeting. They were not formal national delegates, so there was not any NMO authorization for these attendees. Victor Broida, in particular, played an essential and leading role in the formation of IFAC. As referenced above, Broida was originally slated for a key leadership position in IFAC but lacked the imprimatur of a French national group that became the French NMO to IFAC. Although it may have been envisioned that Broida be an early Presidential candidate for IFAC, his advancement to the President position did not occur until several years later.

An even more complex situation arose in the case of the Secretary position. The 1956 Heidelberg Conference was sponsored by the German (eventually the Federal Republic of Germany or FRG) professional society VDI/VDE Fachgruppe Regelungstechnik. Its secretary, Gerhart Ruppel, with decades of experience as engineering society secretary in the FRG, was a key player in the early discussions in Heidelberg, which finally resulted in the creation of IFAC. From the earliest days of the discussions, Ruppel was instrumental in keeping records and facilitating several organizational meetings leading to IFAC's creation. He was a very positive influence on all IFAC-related matters and was enthusiastically supported by all attendees at Heidelberg and subsequent organizational meetings. When the time came for creating the leadership team for IFAC he was the obvious choice for Secretary.

The fact that the IFAC basic framework was organized around national member organizations (NMO) necessitated that each country had such an organization. This certainly was not the case in many countries, including, for example, the United States and Great Britain. Rufus Oldenburger recounts the activities leading up to the creation of the American Automatic Control Council in the US. John Coales describes the evolution of the United Kingdom organization that was first known as the British Conference for Automation and Computation and finally the United Kingdom Automatic Control Council (UKACC). In the case of the Germanys (the FRG and the DDR) the situation was confusing. Both the West Germany technical society VDI/VDE and the East German society Kammer der Technik were appropriate "national" organizations as potential IFAC members. However, political realities at the time did not permit both of them to join IFAC. The West Germans did not agree to have both West Germany and East Germany as IFAC members, while the East Germans would not agree to be represented by a West German organization (VDI/VDE). Since the IFAC constitution required all elected IFAC officers to be elected from an IFAC NMO the decision was made that the secretary be appointed and be designated "Honorary Secretary." The West Germans agreed to donate Ruppel's services without compensation from IFAC during the period of time that they were not an IFAC NMO. Neither West Germany nor East Germany became initial IFAC members, a situation that continued for many years, and will be discussed in more detail later. IFAC continuously needed to adapt to political realities to help assure its future success.

One can speculate about the choice of bi-annual officer terms but as can be seen from several of the referenced papers, the decision to have an American as President, starting in 1958 and the first Congress in Moscow in 1960, may have played some role in this decision. After the war there were many technical conferences emerging with conflicting dates. Coordination was needed to minimize conflicting conference dates and locations for the major meetings. Most of the events were on a two-year cycle so IFAC settled on a triennial cycle for its Congress. Many geopolitical influences had to be taken into account for a successful international scientific federation to function. Even the notion of an international meeting in the USSR with many "West Block" attendees and contributors was somewhat of a breakthrough. As it turned out only authors with accepted papers for the Moscow Congress were issued visas by Soviet authorities.

Of interest to note is that there was not a formal requirement for the IFAC Congress to be held in the home country of the IFAC President. The tradition started in Moscow so that some sort of political balance was maintained by having the second President from the USSR and as host of the first Congress. Although this practice of hosting the Congress in the home country of the President has been followed during the entire history of IFAC, this requirement has never been part of IFAC governing documents. Since the latter part of the 20th century this practice has had nothing to do with political balance. There certainly have been advantages in having the President and Congress in the same country, especially when raising funds to help support the Congress.

The First Constitution and By- Laws (see Chapter V) defined a few other structural features of the federation including an Advisory Committee with essential tasks of technical quality control for papers delivered at the Congress and several "Technical and Special Committees" to support the work of the organization.

From the first days of the federation there was great urgency to put some formal processes in place. As we have seen the decision had been taken at the founding that the first IFAC Congress was to be in Moscow in 1960. There was not much time to organize a World Congress in the USSR. As expected, the 1959 Executive Council and related meetings in Rome were largely devoted to planning for the Moscow Congress. There were no procedures in place for selecting papers for the Congress and many different protocols were discussed at the 1958 EC meetings in Zurich.

There were questions about suitable peer review processes, whether NMOs were to play an important part in paper selection or whether all reviewing would occur at the highest IFAC level, if there was to be some sort of allocation of paper slots for each NMO, how reviewers were to be selected, how publication of proceedings was to be managed, whether or not financial costs of the Moscow Congress would be shared between the USSR NMO and IFAC, what sort of simultaneous translation services were to be provided and at whose expense,

number and sources of plenary papers, formalities needed to obtain USSR visas for travel to Moscow, additional travel outside the Moscow metro area, just to mention a few. Somehow enough of all these questions were resolved in time to ensure an orderly process for paper submission, review, and final selection for the Congress program. For example, there were paper allocations assigned to each NMO and the NMOs themselves were to submit prioritized lists to the Soviet organizers for final acceptance or not. Another significant decision was that technical committees (TC) memberships were to be strictly controlled by the NMOs with one membership on each technical committee per NMO. This reflected the centralization of authority advocated by some of the founding members of IFAC.

Executive Council Meetings and Congresses

1959 - Rome - Executive Council meeting

By the time of the first 1959 Executive Council meeting in March, membership in IFAC had grown from 12 to 21 NMOs. Three IFAC Information Bulletins had been published that were used largely to update NMOs on activities of the founding group between meetings of the Executive Council (EC). The Advisory Committee was working to identify members and activities for the six established TCs. The TCs at that time were Applications, Bibliography, Components, Education, Terminology, and Theory. The most active of these was the Terminology Committee. It could report in Rome that substantial progress had been made in the standardization of graphic systems in the control field. It was planned to publish these standards in the IFAC Bulletin prior to a small technical conference in Chicago later in 1959 where the first meeting of the IFAC General Assembly would occur. In Chicago there would also be a second 1959 Executive Council meeting.

1959 - Chicago - Executive Council meeting

In order to organize IFAC's meetings in Chicago the United States NMO faced some complex political issues. At the time there were severe restrictions on US travel by people from the Soviet Union. Involvement of US State Department officials and immigration authorities were a real challenge for the US organizers of the planned Advisory Committee, EC, and General Assembly (GA) meetings in the Chicago area in September 1959. The Americans were thinking about two possible locations for these meetings - Chicago proper and Evanston, Illinois, a suburb of Chicago. However, travel and visa restrictions that were important to the US government differed between these two next-door communities. Much paperwork was exchanged between the American Automatic Control Council (AACC) and the US State Department about this distinction. There was even a chance that the meetings would not be allowed to occur at all as details were sorted out. In retrospect, all of this seems of little importance and certainly counter to the proposed IFAC Constitution that proscribed IFAC from having any interest in political matters. It finally did get resolved and the meetings were held within the Chicago city limits, to everyone's satisfaction! Delegates attended the General Assembly, and their number increased from 13 of the 22 NMOs. Five more of the 22 NMOs provided proxies to the 13 representatives in physical attendance, so in effect (and legally) there were 18 of the 22 NMOs represented at the Chicago General Assembly (GA) meeting.

Due to the primitive state of the organization at that time, the GA was functioning as the primary management group for IFAC with the EC more or less executing their decisions. This would change in the future when GA decisions in governance matters were moved to the EC. The GA met for three days in Chicago, and this is where the first IFAC Constitution and By-Laws were passed. Up until this time there had been a draft constitution in place. The draft constitution was used as a guide for shaping a first formally adopted constitution. One thing learned since the earliest formative discussions of IFAC organization was that this first set of a real Constitution and ByLaws (see chapter V) needed to ensure a strong role for the NMOs in IFAC governance. It also had to secure a strong role of the EC in overseeing operational functions of the federation. International communications were not as easy as today and with only one person serving as IFAC Secretary, management functions were not a trivial matter.

The 1959 meetings in Chicago also included a joint meeting of the EC and Advisory Committee, where many detailed matters about the 1960 Moscow Congress were hammered out. A unique feature of the Moscow Congress, in many ways an experiment for the fledgling IFAC, was the agreement to underwrite the financial costs of the Congress. If a loss was incurred by the Soviet Union's NMO due to the Congress, IFAC agreed to pay the deficit amount. This was never repeated for future Congresses. Another significant matters taken up by the GA were discussions of languages to be used in the Moscow Congress, as well as languages to be used in published proceedings of this key IFAC technical event. It was also decided in Chicago that the second IFAC World Congress would be in Switzerland in the latter half of 1963. The British NMO had offered a strong proposal for the 1963 Congress, and left Chicago with high hopes the Congress of 1966 might be held in Great Britain. That hope would actually be realized later on.

1960 - Moscow - Executive Council meeting

A brief report on some of the preparations for the Moscow Congress may be found in a published report to the IFAC General Assembly in Chicago in 1959. At this 1959 meeting Harold Chestnut was IFAC President. Alexander Letov was First Vice President (with an understanding that he would succeed Chestnut as President). Letov was chair of the national organizing committee of the 1960 World Congress.

1960 - Moscow - Executive Council meeting

Progress was also being made on other fronts. Papers presented at the Moscow Congress were published in proceedings volumes that were eventually published in English by Butterworth Publishers in England. John Coales, part of the IFAC founding group, was responsible for overseeing this extensive publishing task. A USSR publishing house made a Russian language version available. At this time there were four "official languages" specified in the

IFAC Constitution - English, French, German and Russian, although presentations tended to be delivered in English. There were simultaneous translations of some of the presentations in Moscow with all the expense and complexities it entailed. In order to bring some consistency and oversight into the publications activities of the Congresses, IFAC designated another one of the founders, Victor Broida of France, as IFAC Honorary Editor, a position that persisted for decades, until a more robust publications program for IFAC was established.

Currency restrictions, visas and other legal matters were a constant source of distraction in these early days. As noted above in the case of the 1960 IFAC Congress it was planned that only authors were to be given USSR visas to attend the Congress. It is not clear from the records if, in fact, there were additional visas made available for others as well.

At the time of the Moscow Congress IFAC had six TCs. Their members were largely selected by NMOs. The TCs at that time were: Theory (38 members), Components (17), Applications (15), Terminology (12), Bibliography (11), and Education (10). Chairmen were selected by the Executive Council in part based on nominations from the NMOs. Scientific reputation and wide spread geographical distribution were two of the criteria used by the EC as these appointments were made. The first group of six TC Chairmen came from the USSR, USA, Hungary, Italy, Switzerland, and Belgium. The fact that the earliest committees of IFAC included Terminology and Bibliography reflected the needs of a newly formed international federation being created near the end of a world war. There was little international communication on scientific matters during the war so terminology in different countries had to be rationalized, standards for graphic symbols created, and some common understanding of publications and education activities around the world generated. There were specialists in each country only partially aware of communication standards in other countries that needed a venue for sharing information and coming to common agreement in the control field. IFAC played an important art in this important but ephemeral task. An example of the output of these efforts was a multilingual glossary first published in 1967. Pergamon Press published two succeeding editions of this book in 1981 and 1995 but the title was changed to more precisely reflect their content.

Even as early as 1960 there was an idea that maybe one or more United Nations (UN) agencies might be a source of funding for some IFAC expenses. The donation of the Secretariat in West Germany was very important since that was the major expense for the organization. All supporting funds for that office came from the West Germans through the VDI. Ideas for small conferences and also for the Congresses included some hope that external funds could be obtained from the UN. Discussions about UN funding arose often during IFAC's first decade, essentially all of which came to naught. Victor Broida, in particular, coming from Paris, the headquarters city of UNESCO, was hopeful that some inroads to that agency might lead to some financial help. Nothing ever came of these hopes.

By the end of the Moscow Congress in 1960 many of the initial decisions were made including confirmation that the second IFAC World Congress was to be held under the leadership of the third IFAC President Eduard Gerecke, a professor at the ETH in Zurich. Gerecke was a founder in 1956 of the Swiss Federation of Automatic Control that became the Swiss NMO of IFAC. Basel was selected as the 1963 Congress venue in conjunction with a major trade show. In order to allow for some initial uniformity in officer terms for the first few cadres of IFAC officers, Chestnut's term as the first President was from 1957 to 1959, Letov's term was 1959 to 1961, Gerecke's term was 1961 to 1963 and terms of all future President's would be from the end of the previous IFAC Congress to the end of the next one. Thus each Presidential term would be for three years including the year in which their NMO would be the Congress host. In order to maximize the efficiency of the elections process by the General Assembly it was decided to synchronize the terms with the Congresses rather than with the end of a calendar year. There continued to be some confusion about the terms of office of technical committee chairs; up until the Basel Congress terms that ended with the calendar year remained in place.

Thus, at the conclusion of the Moscow IFAC World Congress, IFAC was a somewhat organized association of 26 of NMOs having started with the 19 founder NMOs. There was a working constitution in place that had been voted in by the General Assembly in Chicago in 1959. It was already obvious that there were immediate needs for revision. Several working committees were in place. Initial planning was underway for a Second World Congress in Basel, Switzerland in 1963. IFAC had a Russian President and a Swiss President-Elect whose terms would end in 1961 at which time a Swiss President would be elected for a two-year term. Discussions were underway about more technical meetings. Challenges remained to fully activate the growing technical committees. There was still much work to be done to sort out various established and emerging international organizations and their planned conferences to de-conflict schedules and improve efficiencies in various technical tasks and meeting schedules. This work would clearly need a few years of effort before the transient period had passed. In general there were great hopes for a growing and successful scientific professional association supported by a group of committed control specialists from around the world. The next Executive Council was planned for 1961 in Bergen, Norway. It was already seen that having two year terms for the President and other officers with a three-year period between Congresses and meetings of the General Assembly was not going to be viable.

> Note: Descriptions of IFAC Congresses from 1960 through 1993 first appeared in the IEEE Control Systems Magazine in Vol. 16, No. 2 in 1996. The author was Stephen Kahne and this material is reprinted here with permission of the IEEE.

1960 - Moscow - Congress

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Fifteen hundred control engineers and scientists gathered in Moscow during the depths of the Cold War. Two hundred eighty-five papers were included on the program. Arrangements for foreign visitors were handled by INTOURIST. The Congress opened in the presence of A.N. Kosygin, who was then first deputy prime minister of the Soviet Union.

Among the papers can be found what turned out to be important papers by V.M. Popov (Romania) on “Criterion on Quality for Non-Linear Controlled Systems”. Popov later was credited with a major advance in nonlinear control systems known as the Popov Criterion. A. Lepschy and A. Ruberti (Italy) delivered a paper on “A Rule for Direct Verification of the Nyquist Criterion in Non-Polar Diagrams”. Professor Ruberti later became a high-ranking scientific official of the government of Italy. Boltyanski, Gamkrelidze, Mishchenko, and Pontryagin's (Soviet Union) paper “The Maximum Principle in the Theory of Optimal Processes of Control” preceded their classic book The Mathematical Theory of Optimal Processes, which appeared two years later. Richard Bellman and Robert Kalaba (U.S.) had a paper “Dynamic Programming and Feedback Control”, which described work of this prodigious team of mathematicians. I. Flugge-Lotz offered a paper, “Synthesis of Third-order Contactor Control Systems”, that marked the later stages of her career both in Germany and at Stanford University. It was at this meeting that R.E. Kalman's “On the General Theory of Control Systems” introduced the fundamental ideas that were to mature during the following decade.

Other notable authors in Moscow included Jury, Merriam, Pugachev, Moisil, Gavrilov, Quack, Tsypkin, Aseltine, Chang, Krasovskii, Feldbaum, Nomoto, Izawa, Coales, Tou, Gibson, Bass, Reswick, Axelby, Higgins, Gorecki, Findeisen, Kochenburger, Nichols, Ziegler, Takahashi, Kranc, Bertram, Sarachik, Truxal, Friedland, Tomovic, Sheridan, Karplus, Tustin, Oldenburger, Strejc, Quazza, Sunahara, Oppelt, Smith, Rosenbrock, Kirchmayer, Mesarovic, Lur'e, Cohn, Vamos, Stout, Evangelisti, Draper, and hundreds more. Thus, beginning with the first one, the precedent was set for the most important control specialists to participate in IFAC triennial World Congresses.

1961 - Bergen - Executive Council meeting

The Bergen Executive Council meeting in 1961, was conducted by President Alexander Letov. This was the last formal action of his two-year Presidential term. Proceedings of the Moscow Congress would appear in two printings, one in English with multilingual abstracts published by Butterworth, and another in Russian from a Russian publishing house. The proceedings volumes also included edited versions of discussions that took place at the Congress. All of this took a year to prepare and was not to appear until early Fall 1961. For vari-

ous technical reasons the English language proceedings was printed in four volumes while the Russian version was bound in six volumes.

The two major topics for the Bergen meetings were the Second Congress to be held in 1963 in Basel and the membership situation as new NMOs were being formed or identified to become IFAC NMOs. It was not unusual to discover that a particular country did not have a suitable national society fitting the criteria for IFAC membership. Recall the constitutional requirement for an NMO candidate: "one (national) scientific or professional engineering organization or one (national) council formed by two or more such organizations having an interest in the field of automatic control". Throughout the world there were discussions of suitable NMO models in many countries.

Professor Donald Eckman from the American Automatic Control Council was Chairman of the Advisory Committee and led the discussion about the evolution of the technical committee structure within IFAC. Unfortunately, this was to be the last meeting of the IFAC leadership team that he would attend as will be noted below. The obvious issues at this time were the problems created by the slow communication means available to the IFAC technical committees, some concern about costs of maintaining these committees and, maybe most importantly, the lack of standards and terminology among specialists from different countries. This reinforced the need for special attention to a common set of terms for various technical ideas and the need to create vehicles for such communication.

It was viewed that there were three distinct matters to be considered - published dictionaries, definitions, and symbols - in the emerging control field. The USSR National Committee (the Soviet IFAC NMO) had independently made progress in this area by publishing Russian-French, Russian-English, and Russian-German dictionaries sometime in the past. So, although it was awkward to be sure, one could translate technical terms in English to German by going from English to Russian to German, a procedure not recommended to all but the most diligent scientist!

The Elsevier publishing company had produced a number of multi-language dictionaries on various topics even including one with translation into 20 different languages, but not in the control field. A recent contribution from Elsevier was the "Dictionary of Automation, Computers, Control and Measuring" including key words and definitions in English and those key words in five other languages without translated definitions.

It was decided that IFAC would work with Elsevier to produce a multilingual dictionary in the control field based on the Russian version created by the USSR National Committee. This turned out to be a major multi-year project and was successfully completed only six years hence. The IFAC Terminology and Biography committees played an important role in the creation of this book. Thus foundations were being laid for IFAC to create a truly in-

ternational community of scientists and engineers working together in the control field. Co-operation with the newly formed International Federation of Information Processing (IFIP) was proposed since they too were devoting attention to terminology and standards in the computer field. Already within the Theory Committee, specialist sub-committees were being formed. The initial taxonomy included continuous control, discrete systems, self-adapting control systems and optimization, and finite automata. This started a long term trend in IFAC where committees split into special interest groups that eventually strengthened and then split off into new technical committees. Within a few decades IFAC would grow from 6 technical committees to over 40!

To keep the IFAC community appraised about such projects and continuing developments, the IFAC Bulletin (in English) was used. It was made available to all NMOs to be distributed by them in their own countries. It is hard to evaluate with precision how this focus on language, terminology, and symbols aided the work of the international teams that were forming amongst individuals who were beginning to form the foundation of the IFAC community. It was obviously a necessary condition for such cooperation. Once again there were thoughts about how UNESCO or other UN agencies could be helpful, but little came from this.

As more and more IFAC technical meetings were proposed by various NMOs, scheduling conflicts and uncoordinated technical meeting topics became even more common. In addition, there was no reasonable process to find out where technical papers from these meetings were available in preprint form, nor when they became available and how well they were peer-reviewed as part of the meeting program creation process. The first major achievement in all this was the final determination that the IFAC Congresses and the President terms would be triennial. It was felt that if other scientific societies could count on this periodicity IFAC would be in a good position to join this community in a responsible manner. This was, indeed, the outcome.

1962 - Cambridge (UK) - Executive Council meeting

The Executive Council meeting in Cambridge began with the report of tragedy. Professor Donald Eckman had been killed in an automobile accident in Europe while on his way to the EC meeting.

By the time of this meeting the Russian version of the Moscow Congress proceedings had been published as planned. Other publications of other IFAC technical meetings were also starting to appear in various countries.

In addition to planning for the Basel Congress to be held in 1963, the Cambridge agenda included procedures for selection of the incoming group of IFAC officers and EC members to be voted in by the General Assembly in Basel.

Recall that during this period other professional engineering/science societies were forming and, in particular, IMEKO (International Measurement Confederation) was cooperating with IFAC in an attempt to rationalize meeting dates and topics to avoid unnecessary overlap.

For the first time the EC was petitioned by two NMOs to overturn decisions of the Congress paper selection committee (what later became known as the International Program Committee - IPC). There was some sympathy expressed partially because of poor communication and delays and two such papers were allowed into the program on the Congress. This happened due to the somewhat informal and early style of operation of IPCs within IFAC and was not repeated. There were other policy discussions about survey papers that were accepted on the basis of either abstracts, or recommendations of Congress organizers. This remained an issue for many years within IFAC's procedures for inviting, presenting, and writing survey papers for plenary sessions. One of the objectives was to ensure that attendees at the Congress could take away copies of papers presented at the meeting with any such costs included in the registration fee. Matters related to simultaneous translation of papers during certain Congress sessions also became a topic for EC discussion. With all these questions about such small items it was noted that the EC was not the right place to pursue such matters and led to creation of a more suitable management structure with committees to handle such matters. Still another detail concerned simultaneous translation of the discussions following many of the Congress papers and eventual inclusion of such edited discussions in the Congress proceedings published after the Congress. Even submission of written discussions of presented papers was a topic to be considered.

It was at the Cambridge EC meeting in 1962 that it became IFAC policy to have Presidential transitions take place at the Congresses. This tradition was to be continued in perpetuity. In addition, the long standing tradition that there be meetings of the Outgoing and the Incoming EC at the Congress was another feature of IFAC governance that has stood the test of time throughout IFAC's history. It was decided that any IFAC meeting to be held in a country with an IFAC NMO required prior approval of the local NMO before IFAC would agree to be the sponsor. There was no thought, even then, that IFAC would assume financial responsibility for the meeting, only that IFAC could be named as the meeting sponsor if agreed to by the NMO. IFAC's technical committees would be the initiators and endorsers of each such meeting.

Even in these early days of IFAC special attention was given to needs of developing countries. Short courses were one such type of support, possibly with funding from UNESCO. Many of these discussions among the various IFAC committees were useful and initiated some worthwhile ideas, always looking at potential funding courses from UN organizations. Seldom was any UN funding acquired but several of the ideas for educational and publica-

tions activities were brought to fruition through voluntary efforts with IFAC and its many NMOs helping to propagate the concepts and stimulating their achievement.

1963 - Zurich - Executive Council meeting

An EC meeting in 1963 was held in March, several months before the Basel World Congress. The tradition was being established to hold EC and General Assembly meeting at each IFAC Congress. However, at this early stage of IFAC's development, the EC was engaged in the details of the coming Congress and required this extraordinary meeting to prepare for it and for the General Assembly meeting, also to be held in Basel during the Congress.

In Zurich, in March, the stage was set for regular triennial turnover of officers and other leadership posts in IFAC, a practice persisting to the present day. The actual decision to go to three-year terms with transitions at the triennial congresses was approved in Zurich.

There was great interest in getting books translated from their original language into other accessible languages, which was part of the internationalization of the field following the war. Agreements were discussed that would encourage translations of bibliographies into other languages as well. Early discussions of creating an IFAC journal were noted at Zurich and IFAC continued the appointment of an "Editor" that eventually was changed to "Honorary Editor" and finally eliminated. The initial "Editor" position was strictly related to the Congress proceedings. The IFAC publications program matured as is described in Chapter IV.

Publications within IFAC at that time were a somewhat sensitive topic, based on the fear that if IFAC created its own journal, this would be unwelcome competition with national journals in control. There were several countries where IFAC Congress papers were available for journal publication in their national journals, and IFAC did not want to set up a competing publication to those of its NMOs. Even within some IFAC NMOs there was concern about overlapping and competing journals in the control field. All of this was to change dramatically in the coming decade.

At the Zurich meeting dates were set for EC and GA meetings in Basel and, with the absence of any records from Basel, we must assume these meetings occurred. In addition, one can see the beginning of a triennial competition to host the World Congresses. It would eventually be decided to hold the third IFAC World Congress in London in 1966 but already in Zurich in early 1963 other proposals for the 1966 venue were offered. When an organization grows so strong that there is competition to host its flagship event, this is a good sign. So, even though IFAC was only in its seventh year at that time, this competition was already evident. At the same time a queue was forming with proposals to host various smaller technical meetings throughout the world.

1963 - Basel - Executive Council Meeting

The Basel Congress was accompanied by a major technical show and exhibition that added to the attractiveness of the venue for both industry and academic attendees. This suggested a precedent to hold IFAC technical meetings of all sorts in different rooms and at the same times so that attendees might find interesting related meetings alongside the IFAC events.

Much of the administrative work by the EC had occurred at the extraordinary meeting in March so the EC meetings in Basel were shorter and more focused on development of the technical committees than on other matters of IFAC governance at the highest level. In 1963 membership had climbed to 28 NMOs. Plans coming from the technical committees were yielding an ever more active calendar of technical meetings outside the triennial Congress, all the while trying to avoid conflicts with other societies. IFAC committed to hold major technical events in Belgium, Romania, Yugoslavia, Sweden, Japan, and Norway with technical standards controlled by the technical committees and hosting details and finances under control of the NMOs in these countries. More tentative plans emerged for meetings in Romania, France, United Kingdom, Hungary, Austria, Japan, USA and USSR. Thus the initial model of IFAC technical work was proceeding according to the earliest concepts of the organization.

It was agreed that the third IFAC World Congress was to be held in London in 1966 with John Coales as President. The 1964 Executive Council meeting was set for Poland. Although initially proposed for Warsaw, it eventually would be held in Krakow.

1963 - Basel - Congress

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Professor Ed Gerecke of the Swiss Federal Technical Institute (ETH) hosted the second IFAC Congress in Basel. Basel, a port city on the Rhine River, is the center of the chemical industry of Switzerland. This Congress was accompanied by a major exhibition of technical equipment, including several digital process control computers of that era. One of the larger exhibits by General Electric (U.S.) displayed the application of a GE-412 digital process control computer then being installed to set up and control the hot strip finishing mill at the Spencer Works of Richard, Thomas and Baldwin, U.K.

In addition to a somewhat smaller program of 159 regular papers presented to the 1,500 attendees, 11 survey papers were delivered. Particularly notable among these were “Statistical Methods in Automatic Control” by V.S. Pugachev and “The Synthesis of Optimal Regulators” by A.M. Letov of the Soviet Union. The Soviet control engineers and scientists of those days had a long tradition of strength in the mathematics of control, much of which was archived in their well-established academic journal Avtomatika i Telemechanika, which was translat-

ed into the English language as Automation and Remote Control. John Truxal's “Adaptive Control” surveyed the relatively young field of control techniques designed to handle changing plant characteristics.

International Federation of Information Processing (IFIP) President Isaac Auerbach described: "The Information Revolution and Its Impact on Automatic Control", in the first IFIP paper at an IFAC Congress. IFIP had been founded in 1960 in a manner and with a charter similar to that of IFAC. Its first Congress drew 2,800 computer specialists from 41 countries. Auerbach's presence in 1963 at the IFAC Congress marked the beginning of close ties between computer and control specialists in these international forums. The planning and execution of joint IFAC/IFIP conferences began at this time. Computer control of chemical processes was under way in industry and at a few academic centers, such as Case Institute of Technology. In fact, Irving Lefkowitz and Donald Eckman of Case Institute had presented a paper on the subject of computer control at the Moscow Congress. Eckman was believed to be a leading candidate to play a major role in IFAC's future, but died in a tragic automobile accident in 1962 on his way to an Executive Council meeting in Cambridge.

In a paper by William E. Miller of the General Electric Company (U.S.), “Application of Automation and Automatic Control Techniques to Metal Rolling and Processing”, the current state of the art in steel mill automation was described. Miller devoted his industrial career at GE to the design and installation of computer-controlled steel rolling mills throughout the world. He was a leading figure in IFAC's Applications Committee and, working with Auerbach, organized and chaired the first three IFAC/IFIP “International Conferences on Digital Computer Applications To Process Control” (Stockholm '65, Menton '67, and Helsinki '71). He later would become the U.S. representative on the IFAC Council, serving until Stephen Kahne assumed that position as an IFAC vice-president in 1987. Another paper on metal processing was presented by A. Ya. Lerner entitled “Achievements in the Automation of Ferrous Metallurgy”. As the computer revolution blossomed, applications of computers to steel plant processes were being reported in many countries. Decentralized control of such processes were of great theoretical interest, but the size and cost of the early digital process control computers made their use difficult to justify, except for high-throughput value processes in chemical and steel plants.

As noted earlier, 1963 also was the year that the IEEE was formed from the IRE and the AIEE, which brought together specialists in radio and computing with more applications-oriented specialists in components and control. This remarkable synergy was to have a long-term positive impact on control systems engineering and its intimate relationship to computer technology. One output of this was to augment frequency domain control system design with state variable analysis and synthesis of controllers. These changes were to be reflected in IFAC Congress papers in the future.

Interesting to note is that IFAC's third president, Ed Gerecke, proposed the IFAC logo in 1962. Since then, the feedback loop has served as the symbol of IFAC, with variations of it as logos for various IFAC events. Those used in IFAC Congresses are displayed in this article.

1964 - Krakow - Executive Council meeting

This discussion of future IFAC Congress venues continued into the Krakow EC meeting one year later. Proposals to host the 4th IFAC Congress meeting in 1969 came from Hungary and Poland; it was decided in Krakow that the Polish invitation should be accepted. There was preliminary discussion of possible venues for the 5th Congress in 1972. The USA invited IFAC to hold the 5th Congress in the United States. That decision was postponed until a later EC meeting. The stage was being set for triennial competition among General Assembly members (i.e. IFAC's NMOs) to offer to host Congresses. That competition continued to strengthen as IFAC matured.

Discussion about organizational details of future IFAC Congresses, were becoming increasingly more common. Concerns were expressed about the quality of presentations at the first two Congresses and several technical symposia that had been held, up to 1964. Plans were made to produce a "How to write a paper/make a presentation" booklet to help and attract contributors to IFAC meetings coming from industry. Writing and presentation skills were not as familiar to them as they are to academics. Active discussers or "rapporteurs" were tried. Simultaneous translation into the four "official" IFAC languages (English, French, German, Russian) remained an issue for each part of each IFAC meeting. The cooperation between IFAC technical committees and NMOs to propose topics and host conferences respectively was growing and nurtured in these years and served as a model for the work of IFAC since then. In support of the technical meetings and Congresses, a proposal was made for Best Paper Awards. Early discussions about the need for IFAC publications vehicles began in earnest based on the experiences of the first few IFAC conferences. Potential authors for IFAC meetings needed journal outlets for their work, usually based on the conference papers. Several societies required conference exposure for works, which resulted in broad discussion of the material before certain journals would agree to publish the papers. Occasionally revisions would be made based on constructive comments made at the conferences. Whether or not preprints should be bundled in conference fees was a topic of growing importance. A Russian journal even offered to devote a special issue to IFAC papers. All in all, the topic of IFAC publications began to evolve into a significant concern for the new federation.

European professors in the control field from many countries were "organized" into a working group on the Continent and were showing interest in formal liaison with IFAC through its Education Committee. They were also encouraging creation of technician level manuals and other educational materials and saw IFAC as a useful supporter of such publications.

IFAC already had a few senior people with important ideas about publications in general who, had been instrumental in developing Congress proceedings, technical glossaries, and the IFAC Newsletter. The early constitution permitted appointment of editors that quickly became formal appointments of Honorary Editor John Coales of Great Britain and Victor Broida of France. Coales was the President of IFAC at that time, and Broida became President at the end of the decade. Coales' leadership in IFAC publications turned out to be one of his signature roles in his lifetime.

Modes of communication in the 1960s, and the cost of attending international conferences and meetings, were a limiting factor. It was of great importance that the technical papers presented at conferences be available to the attendees. Just how to do so, continued to be a challenge, and different models were used over time. There were preprint volumes, proceedings volumes, loose copies of papers available at the conferences, various payment arrangements, post office stations for shipping large quantities of papers and books; hardly any of the models used were satisfactory to the attendees. IFAC experimented to find the proper publications program, which took more than three decades to shape into a stable and suitable arrangement.

During the Krakow meeting, it was decided that IFAC should establish a standardized calendar of the Congresses, in time to include the Technical Meetings, generally on a three-year cycle. This would be of assistance to the international societies of scientists and engineers. It also reduced the conflict between meeting times and venues worldwide. This was consistent with the initial reasons for forming IFAC. The following Executive Council meetings were scheduled for Tokyo in 1965, followed by the London Congress in 1966.

1965 - Tokyo - Executive Council meeting

This year begins a several year period of IFAC's life where the paper trail of EC minutes in particular, have not been found. Considerable effort has been expended to locate these documents but with little success. The IFAC Secretariat was moved twice in the 1970s - from Germany to Finland and finally to its permanent home in Austria - and it seems some of the documents that recorded IFAC history from 1965 to 1976 were lost in these moves. It is known that there was an EC meeting in Tokyo in 1965 but no record of its deliberations has been found.

There is material about the London Congress itself but no trace of minutes, agendae or actions taken by the Executive Council during these years. There are hints. The GA meeting in London in 1966 at the London Congress voted to approve a substantially revised constitution, a copy of which may be found at the IFAC Secretariat. At the London GA applications for IFAC membership from Australia and Spain were approved bringing the total membership to 33. There were a number of publications related announcements involving creation of

an “IFAC Bibliography” and an “IFAC Multilingual Dictionary” with publishing matters being handled by the ISA (Instrument Society of America). At the London GA it was decided to hold the 1969 IFAC World Congress in Poland, the 1972 Congress in France, and the 1975 Congress in the United States.

An existing Pergamon Press journal “Automatica” was being considered as the official IFAC journal but there were many details to be worked out before that milestone could be realized. Professor John Coales, the current President of IFAC, was leading the discussion from the IFAC side and Robert Maxwell, owner of Pergamon Press represented the side of the journal. It is somewhat ironic that at this time the IFAC Publications Committee was being dismantled. That situation would be rectified in the near future as IFAC began a very important move into the publications arena as is reported in Chapter IV. The incoming President Pawel Nowacki ended the General Assembly meeting with warm appreciation for the work of President John Coales but could hardly foresee the substantial work Coales would continue to do for IFAC in the coming decades.

1966 - London - Congress

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Professor John F. Coales of Cambridge University, now retired and living in Cambridge, had been present at the Heidelberg meetings and was destined to play an extraordinary leadership role in IFAC. The Congress in London ended his three-year term as IFAC president. By all measures, the London Congress was very successful, with 1,800 attendees, 287 regular papers, and 10 survey/plenary papers. Both HRH Prince Phillip and Prime Minister Harold Wilson were present at IFAC's ceremonial functions in London. Interestingly, London at that time had no conference facility large enough to handle the Congress. The sessions were widely dispersed in facilities within several hundred yards of Westminster Abbey. At this Congress, Robert Maxwell hosted a luncheon for IFAC officials to announce that the Pergamon journal Automatica would become the first IFAC journal.

A remarkable set of modern technology topics were featured in plenary lectures at this Congress. Thomas Crowley of the Bell Telephone Laboratories addressed “Computer Aided Design”. New languages were discussed, as was the power of a CAD system to contribute to what we now call “computer-integrated manufacturing”, J.C. van Vessem of the Philips Corporation presented “Survey Paper on Micro-Circuitry”, which described the current situation in the transition from the discrete semiconductor devices that came into use in the mid-1950s to what would finally become integrated circuits. This introduction to micro-miniaturization of electronics ushered in the era of intelligent control using distributed micro-computers. Harold Chestnut's paper “Survey Paper on Systems Engineering in Industry” complemented his two-volume series on systems engineering, which was just coming into print in the mid-1960s. A paper by H.H. Rosenbrock and A.J. Young, “Real Time On-Line

Digital Computers", surveyed the growing role of computers with special architecture designed for real-time online process control used in both civil and military applications. In the 1960s, technology change rates were very high. U.S. educational institutions were focused on military applications, and the civilian applications that were being investigated were surrounded by proprietary interests, which led to secrecy and restrictions on open publication of results. The authors discussed operating costs, plant throughput, product quality, measurement issues, and more. Process control software was already viewed as a key component of the design process.

1967 - Menton - Executive Council meeting

Unfortunately we have been unable to find any record of the Executive Council meetings in Menton, France in 1967 nor at the University of Michigan in the United States in 1968.

1968 - Ann Arbor - Executive Council meeting

Unfortunately we have been unable to find any record of the Executive Council meetings at the University of Michigan in the United States in 1968.

1969 - Warsaw - Executive Council meeting

When the Executive Council met at the time and place of the IFAC World Congress in Warsaw there were seven technical committees:

1. Applications
2. Theory
3. Space
4. Education
5. Components
6. Systems Engineering
7. Terminology.

In the case of the Terminology Committee there was continued interest in the IFAC Multilingual Dictionary but it was becoming clear that creation of control oriented terminology and symbols had matured and there would be less need for such a committee in the coming years. Enhanced worldwide communication about progress in the control field was creating a standard language in the field and translations into various languages were proceedings in place apace as needed in various parts of the world. At the same time, in the computer field including computer control of physical process, terminology was maturing rapidly and would

be an important topic for that field for some time to come. This shift of emphasis would be on the agenda of IFAC's Terminology Committee going forward.

IFAC publications were also maturing. The IFAC Bulletin, previously prepared by the office of the Honorary Editor was moved to the office of the Honorary Secretary. Guidelines, whether for authors or symposium organizers, were being standardized and made available free of charge for any IFAC NMO. As is recorded in Chapter IV, George Axelby, was now fully in charge of the new IFAC Journal AUTOMATICA, published by Pergamon Press. More than 200 papers were being received and publications schedules were met so that a regular flow of journal issues was assured. Associate Editors from 11 of the IFAC NMO countries were involved with many tens of reviewers ensuring success of the new operation. It was suggested by the EC that a copy of each issue of this new journal be provided to each NMO as a way to bring it to the attention of the IFAC members. Past Presidents Letov and Chestnut were appointed as IFAC Honorary Editors.

Attempts continued to be made to more closely associate IFAC with UN agencies but as it turned out most of this did not yield concrete results. As IFAC became more visible on the international science horizon there were even "illegal" attempts to have IFAC apparently associated with non-IFAC events of other societies. The "World Congress of Cybernetics" in Vienna in 1970 was one such example. The EC insisted that it be made clear that IFAC was not associated with this event. It was a theme throughout IFAC's history that no casual, unapproved associations were to be permitted. From time to time opportunities were taken to enhance cooperation between IFAC and other groups if IFAC had reviewed such proposals and if they were found to be beneficial to IFAC's NMOs.

In addition to some relationship with the United Nations this was the time that several other international scientific federations were maturing and had important technical overlapping interests with IFAC. These were IFIP - International Federation for Information Processing, IFORS - International Federation of Operations Research Societies , AICA - Association International pour de Calcul Analogique, and IMEKO - International Measurement Confederation. All were young and all were active. It was found desirable to maintain some cooperation between IFAC and these groups. At the beginning these was done by Presidential correspondence including sharing long range meeting schedules and informally meeting when convenient. This was later made more formal by creating what became known as FIACC (Five International Associations Coordinating Committee). It always remained rather informal in its style of operation.

More details were emerging from France and the United States about plans for their Congresses in Paris and Boston/Cambridge in 1972 and 1975 respectively. A panel discussion session was held at the Warsaw Congress to open up strategic planning activities that would

continue into the coming years. Results of this panel discussion were to be discussed at the 1970 EC meeting in Paris.

The General Assembly in Warsaw attracted delegations from 24 of IFAC's 33 NMOs. It was reported that at the previous meeting of the EC (held in the United States, but with no record or minutes from that meeting) there had been detailed discussions of IFAC finances. A small committee was charged with studying IFAC finances and now reported to the General Assembly and recommended increasing the fee structure at all levels. The GA voted to raise the five fee levels to 200, 400, 800, 1600, and 2600, all in US dollars. The goal at this time was to increase IFAC's reserves to one full year of expenses. It was noted that the large subsidy of the IFAC Secretariat by Germany was largely responsible for whatever financial stability currently existed. It must be noted that even a decade after the founding of IFAC, there was still no German NMO in IFAC. The German subvention in IFAC's financial situation was extraordinary!

During the meeting of the General Assembly, Past President Harold Chestnut introduced an innovative idea. He suggested that control concepts such as feedback might be applied to matters of international social, and financial stability. This was a well-known concept in the econometrics community but somewhat new to control engineers. This modest suggestion from the Systems Engineering Committee would begin a process starting with a round table discussion at the Warsaw Congress. It eventually led to focus attention on such "non-technical" areas of study by IFAC including several conferences entitled "Supplemental Ways of Improving International Stability (SWIIS)". Over the coming decades this crystallized into a new IFAC Committee and to an outside foundation funded by the Chestnut family. The foundation was endowed by prize money from the Honda Prize for eco-technology awarded to Chestnut in 1981. This initial mention at the Warsaw GA started long term discussion within IFAC on this new topic.

Since the founding of IFAC its symposia were gaining international recognition. It was the Advisory Committee that coordinated these many symposia. There had been 22 Symposia since 1959 hosted by seventeen IFAC NMOs and sponsored one or more of the IFAC technical committees. Thus the model of TC sponsorship and hosting by NMOs was working well! However, there was no coordinated publishing arrangement for proceedings of these symposia so it was not easy to track down a particular paper from a particular symposium. That would be remedied in the coming decade by the IFAC One-Publisher scheme that was only a vague concept in 1969.

Another major task of the Advisory Committee was to serve as the International Program Committee for the triennial congresses. Working in close collaboration with committees from the host country, the Advisory Committee involvement ensured that each Congress technical program would benefit from the full range of technical expertise in the IFAC com-

munity. With the emergence of the IFAC journal AUTOMATICA, its Editor George Axelby was working closely with the Advisory Committee to encourage journal publication of papers revised after their presentation at IFAC symposia and congresses providing an important service to authors and research workers in the control field.

1969 - Warsaw - Congress

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Until 1969, there had been relatively few IFAC meetings “in the East”. Since its founding in 1957, IFAC had held its first Congress in Moscow and symposia in Budapest, Prague, Bucharest, and Yerevan, but considering the political realities of the day, the idea of holding an IFAC Congress in a country under the Soviet sphere was more complicated than is easy to imagine today. On the other hand, despite the political realities, Soviet engineers and scientists were major players in the control field. Their journals were well known, delegations often attended IFAC conferences (usually accompanied by persons with unknown scientific credentials), and by following bizarre bureaucratic restrictions this exchange was allowed to continue. Many members who were active in the 1960s, can relate stories of Soviet scientists who planned to attend two consecutive meetings in the United States, Western Europe, or Asia and recall seeing the Russian colleagues being forced to return to Moscow after the first meeting and the next day flying from Moscow to the venue of the second meeting located near the other. But, through all of this, IFAC maintained an apolitical stance and concentrated on the effective communication of knowledge about control among specialists.

The Warsaw Congress was under the leadership of Pawel Jan Nowacki, director of the nuclear research institute at Swierk, a suburb of Warsaw. He also was a professor at the Polytechnic Warszawa and a noted control specialist in power systems, especially nuclear power. He was active in the Pugwash Symposia series, the organization that in 1995 just received the Nobel Peace Prize for contributions to nuclear safety. He had spent the Second World War in Great Britain working with the RAF on radar developments. He was the most prominent Polish control engineer of his time and, interestingly enough, not a member of the communist party. To hold high position without being a party member was a real challenge in those days. Although most of my interactions with Nowacki are outside the scope of this article, I should mention that he became my father-in-law in 1970.

The Warsaw Congress attracted 303 papers and 10 plenary lectures. Many of the events were held in the “Palace of Culture”, a Stalinist-era monumental building held to be so ugly that the best view of the city was from its top - the only place in the city from which it could not be seen. Key plenary speakers included John Westcott on “Computational Methods of Optimization in Control”. There was great interest in those days in computer-aided control system design. A 16mm color film was brought to Warsaw, which had been produced by Control Data Corporation on the subject of computer graphics in design. A large audience turned up

for the showing and discussion. A.V. Balakrishnan and V. Peterka described “Identification in Automatic Control Systems”. R. Kulakowski's paper “Optimization of Large Scale Systems” reflected important work on decentralized control, which was carried on in Warsaw by the group directed by Wladislaw Findeisen at the Technical University. Professor Findeisen went on to become rector of the Polytechnic Warszawa and subsequently co-chaired the so-called “Round Table” in Poland in the early 1980s, which catalyzed abolition of the Polish communist government. He later served as a senator in the Polish parliament. His group at the Polytechnic's "Institut Automatyki” had for decades been a leading research and teaching team specializing in large-scale systems and decentralized control.

Other plenary papers included T.J. Williams' "Interface Requirements, Transducers, and Components for On-Line Systems"; T. Isobe's “Automatic Control in the Iron and Steel Industry”; and G. Quazza's “Control Problems in Electric Power Systems”, Georgio Quazza was the leading figure in electric power control in Italy. He was an active participant in Italian professional society activities from his base in Milan, and following the 1969 Congress would emerged as a key IFAC leader. In a bizarre and tragic accident in 1978, he fell to his death in an Alpine disaster.

Due to the complexities of printing and government red tape in Poland, the complete set of preprints were produced in a one-booklet-per-session format.

1970 - Paris - Executive Council meeting

During the Warsaw Congress IFAC President Broida appointed a small team to think about the future of IFAC. Inputs were sought at an open panel discussion at the Congress and using that input as one source of information several issues noted below were considered and reported to the Paris EC meeting:

-Symposia and Congress proceedings were not available until long after the conferences themselves. This did not bode well for the reputation of IFAC conferences when compared with meetings of other scientific societies. Proceedings were the responsibility of the National Organizing Committee (NOC) of the NMO in the host country. Motivation for post-Congress work was not particularly strong, a well-known phenomenon among volunteer organizers of technical meetings. Local printers were used by the NOC and even locating the printing house was not easy following the conference. Attendees had preprints but others seeking to learn of the accomplishments reported at the conference did not have easy access to the information conveyed at the meeting. Identification of this problem began the discussion that would lead to a new publishing policy to be known as the IFAC One-Publisher scheme some years later.

- IFAC was not very successful arranging symposia in new and emerging fields and cooperating with other professional societies in sponsoring meetings. Meeting schedules packed with

short presentation did not provide adequate time for authors and attendees to converse about the technical topics being presented.

-IFAC had a definite “academic” flavor that made it hard to interface with control specialists working in industry. Applications papers were hard to find for each symposium.

-There was also some fear that certain symposia might be repeated many times in subsequent years and that this repetition could conflict with scheduling other meetings on new topics.

The EC’s reaction to this report helped plant the seeds for future IFAC technical organization and publications policies. One important conclusion of the EC discussions was to enhance the role of less formal technical meetings to be called “Workshops” with less formal proceedings requirements and not necessarily full-paper peer review for program selection. This also led to questions about “closed” meetings with restricted attendance. Later it was decided that such restrictions were inconsistent with IFAC’s basic charter. The Workshops would include round table discussions and more opportunity for extended discussions on topics of interest to the particular attendees. Even short courses were mentioned. It later would turn out that short courses were available from private sources and academic institutions so stand-alone short courses never became popular in IFAC. A related and successful feature of many IFAC technical meetings going forward were pre-conference one-day seminars on specialized topics as an adjunct to IFAC symposia, usually for an extra fee for conference attendees.

1971 - Hameenlinna - Executive Council meeting

Although no EC minutes are available for the EC meeting in Hameenlinna, Finland, minutes of the Advisory Committee have been found. In addition to adopting revised Guidelines for Organizers of IFAC Sponsored Symposia, policies were put in place about registration fee waivers for certain IFAC officials who attended IFAC symposia. It was desired to encourage some senior officials to attend each symposium not only as potential technical contributors but also to provide IFAC leadership with detailed understanding of how the symposia were managed and carried out. Numerous future symposium plans for each technical committee were reviewed with a reminder that meetings with narrow technical scopes are preferred for symposia. The World Congress is IFAC’s broad scope meeting. When the discussions ended, 36 IFAC technical meetings had been approved for the period 1971-1974.

The idea of a “traveling symposium” was suggested in an attempt to involve less active NMOs or countries with potential IFAC NMOs in the future. Nothing ever came of it.

An important milestone was reached in IFAC’s history. Since its founding in 1957, the world political situation had precluded either East Germany or West Germany from creating an IFAC NMO. It will be recalled that the IFAC Honorary Secretary Gerhard Ruppel had served

in this office through the generosity of the West German government all these years even though his country was not able to have an IFAC NMO. This changed in 1971 when two new NMOs joined IFAC. The Deutschen Gesellschaft für Messtechnik und Automatisierung in the German Democratic Republic and the VDI/VDE - Fachgruppe Regelungstechnik in the Federal Republic of Germany simultaneously became IFAC National Members.

1972 - Paris - Executive Council meeting

Lacking the EC minutes from the Paris meetings, there is only sketchy information available for Executive Council actions during 1972. The General Assembly in Paris attracted delegates from 30 of IFAC's 38 NMOs. In additional to grappling with some financial concerns due to low membership fees and growing expenses, it was at this time that Honorary Secretary Gerhard Ruppel announced his retirement after 12 years of service. The subsidy from West Germany would continue with a temporary Honorary Secretary being appointed for what would turn out to be one three-year term. This subsidy represented the difference between IFAC realizing a slight loss each year and a large loss in case the Secretariat needed to be fully funded by IFAC. Very soon after the Paris Congress the two Germany NMOs began paying membership dues that helped cover new expenses. However, this change started what became six years of instability in the Secretariat role first with an Honorary Secretary in West Germany and then in Finland. Although AUTOMATICA under the editorship of George Axelby was establishing itself as a strong technical journal, its finances were still weak and not generating a surplus to aid the IFAC treasury.

The USSR representative on the EC raised an important issue about the current constitution. This version of the constitution did not require that nominations of officials from an NMO country get the formal approval of the NMO itself before elections to high IFAC office. In addition, it had already been observed that IFAC activities in a country that were proposed by an IFAC technical committee occasionally occurred without formal approval by the NMO in that country. It was readily agreed by the GA that this tended to weaken the role of the NMOs within IFAC and was unacceptable. Future policies would explicitly require NMO approval of Council member candidates from their country as well as explicit approval of the NMO for any proposed technical meeting in their country.

The Lerner situation was brought to the fore in Paris. For another decade individual IFAC officials would attempt to help the Lerner family but only on a personal basis and not in the name of IFAC. IFAC never did take any action that could be construed as taking a stand on the merits of the Lerner case.

1972 - Paris - Congress

By the time of the Paris Congress in 1972, there had been 38 IFAC technical conferences since its inception in 1957. This initial rate of two conferences per year should be compared with the average of 35 per year that would be seen in 1995. Victor Broida, one of the IFAC founders, was president, and Jack Lozier was vice president. It had already been decided that the 1975 Congress would be in Boston/Cambridge, and Lozier was the designated president. Maybe Jack's Lozier's most important contribution to IFAC was to urge the federation to broaden its technical interests by enlarging the number of technical committees (TCs) from four or five to at least 15. That was followed by later initiatives that have now resulted in up to 47 TCs and, as mentioned, tremendous growth in activities.

The Paris Congress itself attracted 1,300 attendees and included 216 papers. In addition, there were 12 survey papers given in plenary sessions and eight round-table discussions. The round tables were particularly lively, and it was expected that their success in Paris would lead to their more extensive use in other IFAC meetings. It is true that partly in reaction to the success of panel discussions in Paris, the workshop evolved to be a popular type of IFAC technical meeting. Less formality and more opportunity for open discussions appeared to be gaining popularity.

Other experiments were also tried in Paris, including the use of rapporteurs, who attempted to summarize each contribution in a session in order to place it in an appropriate context. Another complexity in the Paris Congress was extensive use of simultaneous translation - still another disruption.

More political activity was in evidence at the Paris Congress than is normally seen in IFAC events. Professor Alexander Lerner from Moscow was just beginning to be affected by what became almost a decade of persecution and harassment by the Soviet government. Although this was neither the first nor the last such political turmoil within an IFAC country (i.e., one with an NMO), in Lerner’s case there were at the Congress itself demonstrations and very personal protestations about treatment of a scientific colleague. IFAC has always tried to avoid political dimensions, even though many have been aware of, and in many cases affected by, political realities.

1973 - Budapest - Executive Council meeting

Unfortunately, no minutes or other data of the 1973 meeting have been found. The EC meeting was held in conjunction with PROLOMAT (Programming Languages for Numerically Controlled Machine Tools) in April 1973, a particularly early month for EC meetings. As noted elsewhere, during the period of transitioning of the Secretariat there was some loss of hard copy minutes and other data. The IFAC Secretariat would welcome any information about possible EC meeting notes for these periods of time.

1974 - Zurich - Executive Council meeting

As in 1973, no minutes have been found for this EC meeting. It was also held in conjunction with a technical conference, this time it was at the time and place of the 4th Digital Computer Applications to Process Control conference. Since no minutes are available, it is from personal recollections that there were continued discussions about a permanent Secretariat and progress on that topic was slow. It would be necessary to make a temporary move of the Secretariat for up to three years, pending final resolution of this important matter.

1975 - Boston/Cambridge - Executive Council meeting

In the mid-1970s financial problems came to the attention of the Executive Council. The root of the problem was the voluntary nature of the dues structure. Since the beginning of IFAC, NMOs were free to select the category of annual subscriptions (dues) they would pay to IFAC and already it was observed that too many NMOs were choosing lower subscriptions than had been expected. Designated dues levels were more or less on a binary scale based on a base rate with multiples of two separating the five levels. The General Assembly was responsible for setting the base rate and the NMOs annually informed the IFAC Treasurer which step of the scale they would choose for the coming year. It was not uncommon for NMOs who were planning to host an IFAC Congress to choose a higher rate than they had previously chosen. In 1975 many IFAC member countries still used currencies that had no value in the West so it was not easy for them to find convertible currency to pay IFAC dues. All this highlighted the need for IFAC to find new sources of revenue to cover its expenses. From the beginning IFAC did not tax NMO Conference/Congress organizers for the privilege of hosting IFAC events. In fact, hosting of IFAC events normally generated hard currency for the NMO that could be used to pay IFAC dues and fund other expenses for the NMO itself. For some countries it was even an attractive way to raise hard (convertible) currency; inviting international scientists and engineers to attend high level technical conferences in the NMO home country and charging hard currency fees for registration of attendees from outside the country. In any case, it was obvious that there was a need to generate other funds to support the modest but growing costs of running IFAC's Secretariat. In the Publications Chapter (Chapter IV) of this history it is described how it happened that IFAC Publications became this source of additional financial support. The financial details of the eventual publications program will be described elsewhere in that chapter, but suffice to say at this point that the publications income stream improved the situation.

Another need yet to be satisfied was the creation of a communications program within IFAC. In 1975 there were 38 NMOs in IFAC throughout the world. Postal mail was the only means of communication; international phone calls were prohibitively expensive. Sending of Telex and fax was awkward and also expensive. Round trip communication could take two weeks and correspondence with some countries hardly existed at all for political reasons. IFAC cre-

ated two printed circular documents to provide basic information to an international audience, the IFAC Information Brochure and the IFAC Information Bulletin. The former was a triennial booklet of more detailed data on IFACs structural units, NMO contact information, officer positions, lists of coming technical events and messages from the President. With such frequency it was not suitable as a "newspaper" for periodic updates of coming events. That was the role of the IFAC Information Bulletin, a 2 to 4 page circular that was distributed to NMOs and others with encouragement to reprint its contents in national magazines and journals. It typically was distributed periodically from the office of the IFAC Secretary and grew in the late 1960s from a simple typed page or two into a standard printed format of a 4 (or occasionally 6) page mailed document to be locally distributed by the NMOs as was appropriate for their country. For several decades this was the main form of general communication to the controls community from IFAC. Needless to say, the IFAC leadership team had more extensive correspondence with mailed meeting minutes and other notifications.

Although IFAC is certainly a truly international organization there were heightened expectations among control specialists in both the Americas and Asia that IFAC's activities had to be expanded outside Europe. The first American IFAC President Harold Chestnut did not host a Congress. The second American President John Lozier had been in office from 1972 until the time of the Congress in August 1975. Barely ten percent of IFAC technical events had been held in the US up to 1975 and only a few others occurred in other parts of the world. At the same time the member societies of the American Automatic Control Council were active in hosting controls conferences in the US and the AACC (the US IFAC NMO) was expanding its annual controls conference, the Joint Automatic Control Conference (JACC). It is no wonder that US control specialists strongly supported the bid to hold a Congress in the US. As can be seen from the IFAC records, this Congress in 1975 initiated a surge of US based IFAC activities and IFAC leaders, eventually resulting in many more events, a much higher leadership presence, and a successor Congress in 1996.

One thing characterizing the IFAC family was enthusiasm for the work of the Federation and dedication by many volunteers to maintain and build upon the work of their predecessors. In the two years surrounding the 1975 World Congress IFAC was responsible for 26 technical events or about 13 per year. Although not all NMOs had hosted events in those two years, the most active NMOs hosted one event per year in the years between Congresses. Congress years remained off-limits for IFAC hosted conferences except for special cases authorized by the IFAC President. In truth, the organization of these conferences, degree of thoroughness of the preparation, paper selection, correspondence among organizers, NMOs, and participants, and dissemination of technical papers presented at the conference was somewhat ad hoc and varied widely. It was only in the 1970s that detailed thought was given to sharing experiences among IFAC meeting organizers with the goal of having future meeting organiz-

ers benefit more from experiences of their predecessors. Drafts of appropriate documents were being prepared during the first half of the decade.

The IFAC Secretariat situation was about to undergo significant change. As noted earlier IFAC's long time Honorary Secretary Gerhard Ruppel had stepped down after his long service and it was hoped that a permanent replacement could be found by the time of the 1975 Congress. By now the task of the IFAC Secretariat had become a major professional responsibility and it was felt that a permanent solution was needed. However, by the time of the Congress there was still no permanent solution in sight. In order to maintain the secretary operation on an interim basis, the incoming President, Uolevi Luoto, arranged to house the IFAC Secretariat in the offices of his company in Helsinki, Finland. The temporary location was in EKONO Oy and was ably managed by Seppo Aarnio and Siipi Saari. Records were shipped from the Dusseldorf offices of Ruppel and Frau Liselotte Schroder, the founding secretarial team, to the Helsinki offices for a term that was to last for three years. More will be revealed later in this narrative about how the IFAC Secretariat became permanently established outside of Vienna in the latter part of the decade.

It is probably fair to say that the move of the Secretariat and major progress of a new IFAC publications program were at the top of IFAC's agenda as the Boston/Cambridge Congress came to an end.

1975 - Boston/Cambridge - Congress

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Even though there had been an American IFAC president at the beginning of IFAC, 1975 marked the first time there was an IFAC Congress in the U.S. Some 1,350 attendees heard 347 papers. The National Organizing Committee was expertly chaired by Nathan Cohn, executive vice president of Leeds and Northrup, an international instrument company. The opening reception in Boston's city hall and technical sessions in various MIT and Harvard classrooms and lecture halls created a somewhat distributed venue for the event. Emphasis of the plenary lectures was rather expansionist and set the groundwork for a broadening of IFAC horizons. As noted earlier, IFAC President John Lozier had emphasized the virtue and need for IFAC to substantially enlarge its TC structure and had orchestrated a growth of TCs from about five to 15 during the early 1970s. We shall remark later that the next American president, myself Stephen Kahne, spearheaded a further growth in the early 1990s to 46 IFAC technical committees.

A plenary lecture was presented in Cambridge by Professor Jay Forrester on "Dynamics of Socio-Economic Systems", a subject attracting much international attention at that time and of considerable interest to an IFAC founder, Mihaljo Mesarovic. By the time of the IFAC Congress in 1975, Mesarovic was well established at Case Western Reserve University in

Cleveland, embracing “systems dynamics” as a useful tool for societal planning. Other plenaries were given by H.H. Rosenbrock ("The Future of Control"), L.R. Klein, later a Nobel Laureate in economics ("National Economic Management"), and M.K. Vukobratovic and Okhocimskii ("Control of Legged Locomotion Robots"), among others.

1976 - Udine - Executive Council meeting

The Executive Council and related meetings for 1976 were scheduled to be in Udine in mid-June, in the Northeastern part of Italy, the Friuli region. On May 6, a very strong magnitude 6.7 earthquake hit that region. More than 900 people lost their lives, 2400 were injured and 157,000 were left homeless. The epicenter of the quake was only some 35 km NNW of Udine and there was significant damage to structures. Udine was also to be the site of an IFAC Symposium on Large Scale Systems at the same time as the IFAC executive meetings. As may be imagined, there was concern that Udine would not be able to host these meetings so soon after the earthquake, but somehow the Italian team was able to make the local adjustments necessary to carry on with these events and the meetings occurred more or less as planned.

The Udine meetings were very productive for IFAC although it must be noted that four of the twelve EC members missed the meeting. Proxies represented three of them and one was not. It is not clear from the records if concerns about the recent earthquake played any part in the absences. It was there that the so-called “IFAC One-Publisher” contract with Pergamon Press was signed and its Managing Board established. There is much more about the preparation for and execution of this contract in the Publications Chapter of this history document. Professor Pieter Eykhoff was one of several IFAC officials who helped create this publishing arrangement for IFAC conferences proceedings and preprints. Professor John Coales was Chairman, Professor Stephen Kahne of the American NMO, Dr. Janos Gertler from the Hungarian NMO, and Pieter Eykhoff from The Netherlands were the initial IFAC members of the Publications Managing Board (PUMB) with Robert Maxwell and two of his Pergamon colleagues rounding out the PUMB membership. Maxwell was owner and publisher of Pergamon. Coales (a Past IFAC President), and Kahne (the Editor-in-Chief of the IEEE Transactions on Automatic Control) were the IFAC Honorary Editors at that time. Gertler was a leading figure in the creation of a comprehensive publications policy for IFAC and soon to become International Program Chairman for the 1984 World Congress in Budapest. Eykhoff played a leading role in negotiating a contract with Pergamon as the official IFAC Publisher. The process of converting IFAC’s ad hoc publications program into a robust publications protocol took quite some effort, that led to high quality publications, which provided much support activity of great importance and use to conference organizers and, it should be stated, to IFAC’s reputation and treasury.

Various “guideline booklets” were under review as part of the ECs efforts to standardize and improve conference-organizing procedures. Eykhoff spearheaded this important develop-

ment. It was deemed important to create educational materials to help new IFAC officials better understand their roles and responsibilities. This was also the first EC meeting since the Secretariat had moved on a temporary basis to Finland. Interactions between Executive Council members and the NMO in the countries where EC members traveled were to be strengthened. Not only does it give the NMO a chance to have a closer relationship with the EC but also the EC members may bewere able to strengthen the image of IFAC within these countries. Even in countries with no IFAC NMO the presence of an EC member traveling in that country can be useful in recruiting new members of IFAC. Brief reports of such visits were requested and were to be sent to the Secretariat.

Attempts to maintain strong liaison with United Nations and other professional societies continued but with modest success. There was even brief discussion about combining the secretarial functions of IFAC with its sister societies (IFIP, IFORS, AICA, and IMEKO) into some sort of centralized office. Nothing ever came of that. This did focus attention on IFAC's need to expeditiously establish a permanent, efficient, modest cost, and independent Secretariat. Even with this strong mandate it will be seen that it took two more years for this to be accomplished. Initial, informal hosting proposals were offered from Great Britain and Austria. In the meantime, the temporary staff in Helsinki would prepare a prospectus describing what would be needed for such an office of the Secretary.

After the Presidency of Victor Broida and the Congress in Paris in 1972, an informal group, The Five International Associations Coordinating Committee (FIACC) was established. Nominally consisting of the Presidents of the five sister federations noted in the previous paragraph, this group met from time to time to iron out potential conflicts of meeting schedules and any other possible conflicts in the activities of these societies. It was a helpful collaboration among the five societies that avoided potential scheduling problems among the societies and resulted in a number of co-sponsorships of technical meetings in areas that overlapped the fields of interest of the constituent groups. FIACC retained an informal standing within the sister federations and liaisons to each society were appointed periodically. Often the liaison officers were past presidents of the societies. It was occasionally helpful when any of the societies were attempting to deal with various UN agencies but as its member societies matured was found to be of lesser value to its members. After about a decade of collaboration, IFAC's interest waned and except for having a good mailing list for distribution of information and newsletters it operated at a low level. Finally, in the mid-1980s, IFAC no longer participated.

The IFAC Constitution and By-Laws needed substantial revision. The 1966 version that was very slightly modified in 1969 was observed to be quite out of date. The main work on this modification would only start in 1978, but in the meantime IFAC's Honorary Treasurer, Michel Cuenod (Switzerland) was charged with looking in more detail to what was required.

The President agreed to appoint an ad hoc committee to create a draft and a process for finalizing a new constitution and bylaws.

1977 - The Hague - Executive Council meeting

Following the Udine meeting, President Luoto appointed a Constitution and Bylaws Committee to prepare a new set of IFAC's governing documents. It was hoped that the creation and iteration of drafts could be ready for the 1981 meeting of the General Assembly in Kyoto. There were several specific deficiencies identified in the 1966 (slightly revised) version. In the meantime the number of NMOs had grown by 33% and the number of technical meetings in non-Congress years had increased by 400%. With changes of this magnitude, the following matters were to be addressed in this revision process:

- Provide a more formal and direct link between the Technical Committees, the source of technical activities of IFAC, and the Executive Council, the managing body
- Improve coordination and control of the executive functions of IFAC; provide for a more representative body dealing with publications matters in light of the new and important Pergamon/IFAC contract; create a body to deal directly with financial and Secretariat related matters;
- Give the President more formalized support from members of the Executive Council in dealing with technical and executive matters and to utilize the experience and personal prestige of the Past President and more clearly define his role in the management of IFAC;
- Decentralize and democratize the elections process for officers, Executive Council members, and all other leadership positions; ensure continuity in the work of all IFAC entities and be welcoming to younger experts from the worldwide NMOs of IFAC;
- Devolve power to the various technical and executive groups within IFAC while enhancing efficiency of meetings, reporting protocols, and decision making throughout IFAC;
- Enhance the influence of the NMOs in IFAC management and leadership;
- Align responsibilities and obligations among numerous IFAC entities more consistently.

President Luoto appointed John Coales (Chairman), Janos Gertler, and Stephen Kahne to the ad hoc Constitution and Bylaws Committee. This effort was to take a full four years with final acceptance by the General Assembly in 1984 in Budapest even though it had been hoped to complete the process by 1981. There were numerous interactions with various IFAC entities and individuals and annual progress reports to the Executive Council with final iterations during 1980 and 1981.

1978 - Helsinki - Executive Council meeting

The 7th IFAC World Congress was held in Finland and was the venue of the General Assembly, Executive Council, and related meetings. By this time, the new IFAC/Pergamon Press publishing arrangement was well underway and an important decision was made to move the Secretariat to a new permanent location in Austria. Academician Tibor Vamos, a leading science executive in Budapest was instrumental in working with the Austrian government to create this new IFAC Secretariat in Laxenburg, Austria, a suburb of Vienna. This all had important implications for IFAC's financial stability and the chance to maintain a permanent home of the secretarial operations would lend a sense of stability for the first time in IFAC's first 20 years.

The agreement with the Austrian government to house the Secretariat in Laxenburg was signed on April 21, 1978. The Secretariat was housed on the second floor of a townhouse on the Laxenburg Schlossplatz in the village about 20km South of Vienna. The International Institute of Applied Systems Analysis (IIASA) was already located in a palace (formerly the summer palace of the Hapsburgs) on this town square and several years later the International Federation of Information Processing (IFIP) Secretariat was to join the community. There were few actual connections among these three organizations, but their proximity added a certain intellectual atmosphere to this small town. The Austrian government provided some financial support for the IFAC office facilities and this cooperation was to continue for decades into the future. IFAC officials, regularly visit the staff, and often give lectures at IIASA or elsewhere in the region, which adds to the vitality of the community.

Although there were transition expenses associated with the secretarial operation being moved from Helsinki to Laxenburg, subsidies for the new Secretariat offices and initial income from the One-Publisher arrangement with Pergamon Press were helpful in creating a stable financial base for IFAC moving forward. IBM "selectric" typewriters, a telefax machines, copier, telephones, and other various equipment were purchased or leased and a staff of two hired to work under the supervision of the newly appointed IFAC Honorary Secretary Fred Margulies. Because of the proximity to Budapest, the Hungarian NMO was particularly helpful in these early days with the new Secretariat. As part of the transition, the editorship of the IFAC Newsletter was to be moved from the office of a volunteer, Mogens Kummel of Denmark, to the new Secretariat in Laxenburg. With a permanent Secretariat it was felt that centralizing the news functions of IFAC in the Secretariat was preferable to having an external office for collecting information about various IFAC activities.

1978 - Helsinki - Congress

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By the time of the Seventh World Congress of IFAC, the scope of the federation and its level of activity had reached a new plateau. Between 1975 and 1978, there had been 35 symposia and workshops sponsored or co-sponsored by IFAC's now 15 technical committees. Just as a reference point, the 1960-1963 triennium saw just two such conferences. A new publications program had been initiated, which integrated all IFAC publications, including its journal, Automatica, under a single publisher, and the decision had been made to create a permanent IFAC Secretariat in Laxenburg, Austria, just outside Vienna. IFAC's social conscience had also emerged, as its Committee on Developing Countries continued activity that had started a few years earlier. IFAC had certainly emerged as a mature professional society 20 years after it's founding.

The Helsinki Congress, under IFAC President Uolevi Luoto, attracted 1,100 participants from 45 countries and 294 papers, chosen from 750 submitted. It was opened in the presence of the president of the Finnish Republic, Dr. U.K. Kekkonen. Six parallel sessions ran during the five-day event. This Congress also introduced a problem that tends to continue to this day - high registration fees. In 1978, Finland was a very expensive country to visit. Many felt that the fees and local costs were an important reason why the number of attendees was below what was expected.

Fifteen round-table discussions were conducted during the Congress. Topics ranged from education and developing countries to fuzzy decision-making. These sessions were characterized by lively debate, and the essence of the discussion was captured and published in the Congress proceedings- published, of course, by the IFAC publisher, Pergamon Press.

There were four plenary papers at this Congress: D. Ernst, a vice president of Siemens AG, described "New Trends in the Application of Process Control", highlighting the pending revolution in microprocessors, which would accelerate decentralization in all industrial process control. This fundamental shift from centralized computing resources in process control beginning in the 1960s would turn out to be one of the most basic paradigm shifts in automatic control made possible by computer technology advances. For companies such as Siemens, this evolution represented a very important commercial opportunity and created needs for new software paradigms as well.

A complementary plenary lecture by D. McRuer on "Human Dynamics in Man-Machine Systems" added the human component to distributed and decentralized industrial process control. McRuer emphasized the relationships between dynamic properties of humans in control loops and the dynamics of the process to be controlled.

The other two plenary lectures were "Automatic Control and Artificial Intelligence" by T. Vamos and "Advances and Open Problems in the Control of Large Scale Systems" by M. Athans. A consistent theme through all these papers was the distributed nature of physical

processes and the implication for distributed control strategies to suitably control such processes.

1979 - Laxenburg - Executive Council meeting

The first meeting of the IFAC Council in the new home of IFAC was tempered by the tragic loss of one of IFAC's most admired leaders, Giorgio Quazza of Italy. He died in a mountaineering accident in August 1978. Quazza was a major contributor to the power systems engineering field and a devoted leader in numerous IFAC activities. In Laxenburg the Council determined that a major medal be created recognizing outstanding technical contributions - the Giorgio Quazza Medal. The Hungarian NMO, under leadership of Tibor Vamos, a future IFAC President, offered to oversee the design and production of several copies of the medal for future use. The Quazza Medal was designed by the noted Hungarian sculptor Tamas Vigh. Tibor Vamos arranged for multiple copies of this artistic piece and donated them to IFAC, as his personal gift to the federation. Past President John Coales led an effort to formalize the criteria and procedures for awarding the Quazza Medal.

The Constitution Committee was continuing its work hoping to finish in time for a General Assembly vote in 1981 in Kyoto. As noted earlier, this revision would be a substantial one to accommodate IFAC's rapid development since the late 1950s. In conjunction with this work, Professor Pieter Eykhoff of the Netherlands was leading an effort to envision the "Future of IFAC". It was important that these two major tasks be coordinated for consistency. With inputs from the Executive Council each year it was agreed that priority be given to improve services to individual control engineers and to the community by strengthening links to the NMOs and IFAC's technical committees. Better cooperation with industry without neglecting the academic world was another identified need. Inputs were sought from all NMOs and IFAC officials during this process. Complications would occasionally arise in which the IFAC NMO in a country would either be opposed to or unaware of approaches (by individuals) to IFAC to cosponsor a technical event in their country. Apparently bypassing the NMO when making sponsorship decisions was inconsistent with the goal of strengthening the NMO roles in IFAC.

There were situations where in-country national conflicts between organizations existed. IFAC had to be sensitive to such possibilities and avoid doing anything that was interfering with the NMO position. At this stage of IFAC's development such matters rose to the level of the Executive Council and the IFAC Guidelines for Organizers had to address such concerns. As the procedures for proposing IFAC technical events were formalized, such potential conflicts had to be avoided.

Final plans to move the IFAC Newsletter operation into the new Secretariat were approved. It was already clear that publications pressure on AUTOMATICA was growing and that a

single IFAC journal probably would not be sufficient in the future to support the ever growing technical activities of IFAC. In addition, even in these days, conference proceedings were growing in volume and becoming more and more unwieldy just to produce and ship so this problem began to occupy some of the time of the Executive Council. And it was not just a matter of size. There were issues with coordination, scheduling, reviewing, production and distribution of IFAC's technical output that were occupying EC time and in need of a solution. These were partly resolved by the revised constitution and bylaws being prepared by the Constitution Committee of Coales, Gertler and Kahne.

1980 - Cleveland - Executive Council meeting

The new Secretariat had now been operating for one year, and a review of the new office activities was requested. It was noted that IFAC's financial base was still quite weak and that new sources of income were going to be required to support the ever-growing activities of the Federation. Some concern was expressed about the number of workshops compared with the number of symposia that were being scheduled. Full paper reviews were not required for workshops and the question was raised about whether or not this less formal process was, in part, driving the workshop/symposium ratio. Co-sponsorship of technical meetings with other (non-IFAC) organizations was also discussed with a potential need to control the number of these as well. With respect to workshops in particular there was a tendency to propose workshops with restricted invitations - closed workshops. These were contrary to some national governmental regulations and this required careful revision of workshop guidelines to clarify the situation. IFAC's Policy Committee was doing some in-depth analysis of this topic as well as clarifying the rules about IFAC meetings being held in countries without an IFAC NMO. One direction being considered was the creation of "regional Conferences" that would involve IFAC NMOs in the region when a conference was proposed in a non-NMO country.

The work of the Constitution Committee had been carried on during the previous year and features of an emerging new Constitution were ready for Council inputs. One of the main features of the proposed new structure of IFAC was to replace the Advisory Committee with a Technical Board and to gather the various "executive" functions of IFAC into a parallel "Executive Board". This latter board would consist of several existing committees in the area of policy, publications, awards, finance and administration. Vice- Presidents would head these two Boards, and the Executive Council would be renamed as the Council. This would affect the VP structure to eliminate the hierarchical arrangement of a First Vice President (usually with implied progression to the President position) and a Second Vice President and replace it with the two Vice Presidents at an equal level with responsibilities for the two equally important functions of technical and executive activities. There was some concern expressed that as a leadership cadre of volunteers we should be careful not to increase the complexity of the organizational structure unless it was necessary. As the discussion proceeded it be-

came clear that such restructuring was indeed a needed change and the Constitution Committee was asked to simplify it as much as they could, but not more than was required. There was still hope that the final proposal would be ready for a General Assembly vote in Kyoto in 1981. To support the goal of having increased involvement of the NMOs, the EC decided to circulate this new concept/structure to the NMOs for their preliminary inputs, which delayed the final vote by the General Assembly to 1984, in Budapest. Engagement and transparency was to trump speed. It was also noted that, in conjunction with the new Constitution, it would be necessary to create a set of "operating rules/guidelines" to clarify the many changes in procedures consistent with the new documents. This was to be undertaken in parallel with the completion of the actual Constitution and ByLaws.

As the IFAC Publications Managing Board (PUMB) was maturing and beginning to promise a major impact on IFAC finances (a good thing!), new and important questions of conference organization and publications cost management were coming forward. Production of workshop proceedings with little market potential was not in the best interests of either IFAC or Pergamon Press. Both PUMB and the IFAC Advisory Committee were asked to more carefully analyze this situation and recommend actions if needed to the Executive Council one year hence. There was an important balance to be considered between the needs of workshop attendees, the wider control community, and financial efficacy. To be sure, the PUMB operation was strongly supported by the IFAC leadership and renewal of the PUMB contract for the next five years was enthusiastically embraced.

Already in 1980 the IFAC Newsletter, now being run out of the Secretariat, was viewed very positively and this one-year experiment was declared successful. This style of operation would be carried on into the future.

As a brand new topic for IFAC, the first IFAC President Harold Chestnut presented an idea to the Council suggesting that the control system community may have something to offer in the area of international stability. This rather controversial idea of engaging technical control specialists in the economic/political realm of society was not easily received by the EC but was felt to be of enough interest to be referred to IFAC's technical committees (Systems Engineering, Social Effects of Automation) for further consideration and recommendations in the next year.

Although IFAC was always committed not to "engage in any activity with financial or political aims." from time to time it could not avoid being approached by others who wished to obtain IFAC's support for some political/humanitarian issue. Occasional visa problems would arise from an author or potential attendee at an IFAC event. Except to clearly describe the purpose of the technical meetings there were no means of influencing visa-issuing authorities. Letters of invitation were issued from time to time and there seemed to be some value for the potential attendees from certain countries to this practice. There were occasional

human rights issues that would arise in one country or another and again, even if they involved prominent IFAC personalities, much care was needed to avoid IFAC taking a stand inconsistent with its constitution. It should be noted that some of these personal freedom issues were very hard for professional colleagues to handle within the IFAC family. It was essential that such matters be handled outside the IFAC structure.

1981 - Kyoto - Executive Council meeting

In a major milestone for IFAC, the 8th World Congress was held in Asia under the leadership of IFAC President Professor Yoshikazu Sawaragi. By the time of the Congress, the new IFAC Constitution and ByLaws had been finalized for adoption by the General Assembly in Kyoto. Operating Regulations/Rules that clarified how the new governing documents would be actualized in the day to day-to-day management of IFAC were ready for distribution for final comment by all interested IFAC officials. It was recommended that this process be completed by the time of the 1982 Council and related meetings.

Operating under the new structure of IFAC based on the General Assembly vote to adopt the new Constitution, a generic schedule of meetings was created to ensure that the two new major boards - the Technical Board and the Executive Board - had appropriate meeting time slots scheduled to precede the Council meeting itself. Over the years this complex schedule of intertwined meetings was put into place to minimize the overall length of the meeting "week" ending with the Council meeting. That schedule is modified in Congress years as will be described later on.

In the past, the practice was that two meetings of the Executive Council took place in each Congress year; the outgoing and incoming EC meetings. Now, in 1981, the outgoing EC was the final meeting of that group under the old constitution and the incoming "Council" (new name for the old EC) met under the new constitution. During the Congress the General Assembly had voted to approve the new constitution. Although the coming triennium was to be a "shaking-out" period in case there was any need to make small changes in constitution wording based on operating experience, indeed the new constitution was in place. The first Technical Board (TB) Chair was Boris Tamm, rector of the Technical University of Tallinn in Estonia who would be elected IFAC President for the 1987-1990 triennium. Chapter III on technical activities of IFAC highlights the new structure of the TB. William Miller of the United States was the first Chair of the new IFAC Executive Board (EB). Miller was a long-time contributor to various IFAC entities including the American NMO, the American Automatic Control Council. He was a well- known power systems engineer in the steel industry, working for the General Electric Company.

By this time, IFAC was sponsoring or co-sponsoring more than 50 technical meetings per triennium. There were so many technical meetings that ideas were floated suggesting limita-

tion of the total number of technical meetings, specified ratios of workshops to symposia, limitations of co-sponsorship, etc. The conclusion was that such limitation was not necessary but that maybe more emphasis was needed on quality control of paper submissions. This could be carried out more effectively in the future under the new structure of IFAC's Technical Board and expanded list of IFAC technical committees. One area of special interest was the requirements for organizing Workshops.

Although it was previously noted that effective interactions with various United Nations agencies was quite limited, colleagues from the French NMO reportedly made some progress in IFAC/UN interactions that led to some limited support from UNESCO to support activities in developing countries. This had a minor effect of IFAC's financial situation but was well received by the Council. Roland Chaussard of France took the lead in developing these UN relationships. Michel Cuenod was a strong proponent of IFAC 's involvement in developing countries. He had spent some of his professional career working in an international consulting capacity on cement production facilities in developing countries. Much of his work was in Libya and Turkey and he had taken special interest in educational needs in these countries. As the long time IFAC Treasurer (1959-1981) he was in a position to influence IFAC's activities in these countries.

The Council took note that the activity of the IFAC Policy Committee had been interrupted by the untimely death of Academician Boris Petrov, former head of the Soviet space program and an early member of the IFAC leadership group. He was Chairman of the IFAC Policy Committee at the time of his death.

Planning was underway for the 25th Anniversary of IFAC to be held in Heidelberg in 1982. The Council decided that a celebratory event should be held in Heidelberg, at the same location where IFAC was conceived in the late 1950s. Professors Manfred Thoma and Pieter Eykhoff agreed to organize the activity supported by Fred Margulies, the IFAC Secretary. Professor Thoma was assigned to be chair of the anniversary planning committee while serving as IFAC's President-Elect. See more details in Chapter V.

1981 - Kyoto - Congress

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The eighth IFAC Congress, in Kyoto, Japan, was a remarkable event for IFAC. It was the first IFAC Congress in Asia and coincided with the emergence of Japan as a world leader in science and technology. The meeting was held away from the modern capital of the country, in the city known for its long tradition of art and science; the actual venue was the dramatic Kyoto International Conference Hall. This ultra-modern conference facility, located in the ancient capital of Japan, in the vicinity of so much Japanese art and culture, added to the

outstanding technical program of 600 papers, seven survey plenaries, 17 round-table discussions, and eight case studies.

This was the first Congress since the tragic accidental death of Georgio Quazza. In memory of their dear friend and colleague, the IFAC Executive Council created the premier award of IFAC, to be bestowed at each Congress on an eminent contributor to the control field and to IFAC. At the Kyoto Congress, the first award of the Quazza Medal went to John F. Coales, professor emeritus of Cambridge University and fourth president of IFAC. The tradition continues to this day of presenting the Quazza Medal at the opening ceremony of the triennial World Congress.

Under the leadership of Yoshikazu Sawaragi, professor at Kyoto University and IFAC president, the Congress was brilliantly organized in the elegant conference facility. Two of the outstanding plenary lectures are described below.

Karl Astrom's plenary paper on “Theory and Applications of Adaptive Control” reviewed the somewhat erratic progress of adaptive control during the previous 30 years. Although there had been early enthusiasm for adaptive control for autopilots in high-performance aircraft in the 1950s, a combination of inadequate hardware and non-existent theory effectively stopped work on the subject in the 1960s. Control theories flourished in the 1960s, but effective adaptive control practice awaited new computer technologies required to realize results of the theory. Astrom's paper put this evolution into perspective as of 1981.

“*Optimization and Analysis of Discrete Event Stochastic Systems with Application to Manufacturing Technology”* was the title of Y.C. Ho's plenary paper at the Congress. This was very early in Professor Ho's introduction of a theory of discrete event dynamic systems (DEDS), which he hoped would shed light on the behavior and control of dynamic systems that evolve as a result of distinct events, such as receipt of messages or occurrence of physical phenomena. It was an attempt to introduce experimental techniques into the analysis of complex systems such as traffic flow. This paper marked the beginning of a vital line of control systems research and application. Many Congress attendees who had not been familiar with Japanese technology advances came away with a better appreciation for the capabilities of Japanese science, technology, and industry.

1982 - Heidelberg - Council meeting

The Council meetings were held in Heidelberg during the 25th anniversary year of IFAC. In addition to the social activities at the event there was an all-day seminar including the following lectures:

H. Chestnut: 25 years of IFAC - From Heidelberg to Heidelberg

R.E.Larson: Impact on Technology

I. Kato: Impact Caused by Robot Technology

H. Zemanek: Automatic Control and Information Processing

V.A.Trapeznikov: Automatic Control - Impact on Society

H.H.Rosenbrock: Robots and People

E.Pestel: Economic and Social Aspects of Modern Technology

A.Jensen: Impact on Economy

Wu Jong-Ming: The Impact of Cybernetics and systems Approach on Population,Environment and Resources

A.G.Evstafiev: Impact on Developing Countries

The seminar proceedings volume included a paper by IFAC's 4th President John F. Coales. It was not actually presented at the seminar but later published under a slightly different name.

Read more about the 25th and 50th anniversaries in Chapter IV.

With a new hierarchy of boards and committees IFAC was launching a new operating style that could more readily accommodate a much larger number of control specialists in its leadership and operation. In its Heidelberg meeting the Council made it clear that all IFAC administrative and technical meetings were open to the entire community, this point was emphasized by the Council at the Heidelberg meeting. There had been some confusion whether or not any interested parties, not formal members of IFAC entities, were welcome to attend meetings as observers.

The concept of regional meetings was debated at this Council meeting. Regional meetings were defined at that time to be meetings organized by non-IFAC identities with some involvement of one or more of the IFAC TCs. This was of particular interest to people from developing countries that did not have the resources to organize an IFAC technical meeting, but abided by existing IFAC conference standards. For example there were typically not enough contacts among the few organizers in a developing country with an international group of specialists who could populate an International Program Committee (IPC). IFAC publications policies were also a challenge for people in developing countries. The IFAC Developing Countries Technical Committee advocated for a somewhat different class of meetings to be called "Regional Meetings". This was approved by Council and finally led to an occasional regional meeting per year as needed. The concept was later expanded to include collaboration between such meetings as the American Control Conference (ACC), formerly the Joint Automatic Control Conference (JACC), in the US and later to the Latin American, the European, and the Asian Control Conferences. It was eventually a routine practice for col-

laboration with such conferences several times per year. All such meetings generally followed IFAC policies for affiliation without the constraints in place for co-sponsorship. Operating Guidelines were suitably modified to account for this new arrangement.

The IFAC officers, during the term of President Yoshikazu Sawaragi (1978-1981), began an annual meeting of officers, which was always held at the Secretariat in Laxenburg. They were of an informal nature for the purpose of planning the coming Council meeting and having informal discussions about various matters. It was one way to keep the officers in touch with the Secretariat staff, and with developments in Austria. Austrian government support for the Secretariat was an important component of the IFAC budget. These meetings generally included a small dinner including one or more Austrian government officials and generally included a public lecture by one of the IFAC officers. The commitment was that there would be no decisions made at these annual meetings since that was the responsibility of the Council. Informal officers meetings were not contemplated in the new Constitution. The Council was asked to consider whether or not the meetings needed to be explicitly noted in the new Constitution and it was decided not to do so.

Another constitutional innovation was creation of the "IFAC Advisor" position with new Advisors being appointed by the President at each Congress. Advisors were to be appointed by the President with no external vetting required and was suggested as a way to retain the involvement of IFAC Past Presidents and other long-serving members of the leadership. The first such appointments were made at the Kyoto Congress the previous year. It was envisioned that not more than one or two such appointments would be made each triennium and with an offer from Tibor Vamos, current IFAC President, the Hungarian NMO designed and produced a small supply of special seals to be given to each Advisor.

A routine triennial process was set up for officer nominations with inputs from all IFAC NMOs. Care was needed to ensure wide geographical distribution of office holders. Numerous other constraints had to be taken into account and an Elections Committee created at the Council meeting in the year following each Congress to prepare a suitable slate eventually to be voted on by the General Assembly at the succeeding Congress. The complexities of this multiyear process were codified in one of the Operations Guidelines. The year following a Congress year, the elections committee is appointed and in the year preceding the next Congress (and the next General Assembly), the Council approved or modified the Elections Committee recommendations and prepares the slate for presentation to the General Assembly in the Congress year. All this is more complex than may be seen at first glance since the nominee for President-elect and the NMO selected to host a future Congress are made simultaneously and a wide geographical distribution of Council members is also required. Over the decades this practice has worked well.

Fred Margulies, who was instrumental in obtaining the facilities and support for the IFAC Secretariat and who, himself, served as the first “permanent” Honorary Secretary, indicated that he was planning to step down by the time of the following Congress in 1984. President Vamos and incoming President Thoma were tasked to find and vet a new Honorary Secretary in the coming two years.

In retrospect it is interesting to note that an important discussion item was whether or not to authorize the Secretariat to acquire a “word processor”. It was planned to spend not more than one year to consider alternatives or to make the purchase or lease recommendation back to Council.

Publications policy matters were also considered at this meeting and those are noted in the Chapter on Publications (Chapter IV) in this document.

The ad hoc Constitution Committee was continued until the next Congress in Budapest just to oversee the first triennium of operation under the new document.

1983 - Laxenburg - Council meeting

The Council and related meetings were held in Laxenburg in 1983 that gave the whole IFAC leadership team their first chance to visit the new Secretariat facilities, a pleasurable task for all. The somewhat unusual time for the meetings, in November, allowed for the Congress Program Committee and Council meeting to coincide making travel and costs less of a burden than if the Council had met in their usual Summer time frame.

An experiment was tried at this Council meeting in which an individual was asked to deliver a technical lecture to the Council, as a way to focus attention on an overriding international problem in the control field. Professor A. van Cauwenberghe from Belgium discussed “Trends in Automatic Control Applications.” The talk was based in large part on several recent IFAC symposia and workshops that had been held on various applications topics. The lecture was well received by the audience that included the IFAC Council and the research staff from IIASA (International Institute of Applied Systems Analysis), a neighbor of the IFAC Secretariat on the Schlossplatz in Laxenburg. Although the value to the Council was clear it proved hard to continue this practice of a technical presentation as part of the Council meeting agenda due to the number of administrative matters that required the attention of the Council at most of its meetings going forward. When the Council meets at the time during the Congresses there is ample opportunity for Council members to attend numerous technical lectures during the Congress week. Even with the other two Council meetings during a triennium, Council meetings are generally held at the time and place of an IFAC technical event so there is at least limited opportunity for attendees to combine the governance activities of the Council with technical updating.

Even though the new Constitution had only been in place for two years, it was already evident that many TCs were forming working groups (WG) to facilitate their activities and one could foresee the need to greatly expand the number of TCs, in order to avoid creating a hierarchical relationship among the technical entities of IFAC. In principle there was no reason not to encourage such expansion of the number of TCs. Part of the consideration was to ensure that the individuals who led these various entities received appropriate recognition in their communities for all this volunteer work. Such expansion of the number of TCs is described elsewhere in this history (Chapter III) and the growth progressed smoothly. H. Akashi of Japan presented some ideas about such expansion in a paper of "Quality and Coordination" that was useful as expansion was contemplated. It was clear that constructive feedback between the Technical Board and all these entities was essential for success. It was also noted that inactive individuals in any of the TCs and WGs should have their membership terminated rather than being carried along with no apparent contribution to the efforts of the groups.

As early as 1983, applications to host the 1993 IFAC Congress had been received from NMOs of Australia, Netherlands, Spain and the United States. Prior to the Council meeting the USA and Spain withdrew their proposals and the Council determined that the Australian offer would be accepted with the distinguished control scholar Professor Brian D. O. Anderson as the designated IFAC President for the 1990-1993 term of office. Following three consecutive Congresses in Europe, Sydney was accepted as the 1993 Congress venue.

As anticipated in 1981 a very few minor changes in the new Constitution were deemed desirable and were finalized for presentation and approval by the 1984 General Assembly in the following year. The topics that were refined included IFAC's purpose to reflect the impact of control technology on society without being involved in political matters, clarifying various categories of Council membership (elected, ordinary, and appointed), some details about succession planning for TC chair positions, and refinement of TC structure including working groups.

1984 - Budapest - Council meeting

As was the tradition at IFAC Congresses the IFAC Council met in two sessions. The outgoing Council preceded the Congress and the incoming Council met at the conclusion of the Congress. There was an unexpected development following retirement of Fred Margulies who had served as Honorary Secretary for two triennia. The original plan had been to appoint an Austrian as Honorary Secretary but that turned out to be impossible. Fortunately Gusztav Hencsey from the Computer and Automation Institute in Budapest was available to take on this responsibility. Hencsey already had important IFAC experience as one of the leaders of the Budapest Congress and was geographically close to Laxenburg, even though he did not reside in Austria. His term of office started at the conclusion of the Budapest Congress.

IFAC's financial stability was still weak but IFAC Publications income from the IFAC/Elsevier contract was growing and much of the initial startup cost had been paid off. It was anticipated that a modest increase in annual NMO fees of 15% would be adequate to meet future costs of running the Secretariat and for other miscellaneous expenses. As specified in the constitution, the annual fee to be paid by NMOs was selected by each NMO from a published fee schedule. With a 15% increase in the fees in this new schedule, the General Assembly approved of the new fee structure in the coming triennium.

1984 was the Centennial anniversary of the Institute of Electrical and Electronics Engineers (IEEE). IFAC Vice President Bill Miller represented IFAC at the IEEE Centennial Celebration and received a medal on behalf of IFAC commemorating the professional ties between the two organizations. IFAC had invited Bob Larson, the IEEE President in 1982, as a keynote speaker at IFAC's 25th anniversary event in Heidelberg as noted earlier. Stephen Kahne from the US, IFAC Policy Committee Chair, was the IEEE Vice President for Technical Activities in 1984.

1984 marked the end of the work by of the Constitution Committee of Coales, Gertler and Kahne; so after three years of writing and three years of monitoring by this ad hoc committee, the General Assembly finally approved the new Constitution.

Several NMOs were eager to host a future Council meeting. Those expressing interest included Austria, Finland, Germany (who would be hosting the 1987 meetings at the IFAC Congress in Munich), the UK and the USA. Preliminary offers to hold future Congresses were received from the USA and China. It would turn out that the 1985 Council meetings would be in Boston, then Zurich in 1986 and Oulu in 1988.

1984 - Budapest - Congress

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In the intervening years between Kyoto and Budapest, IFAC's 25th anniversary was celebrated in Heidelberg on Oct. 1, 1982. Earlier we referred to the role of Heidelburg in IFAC's founding. Since this article is about IFAC Congresses, not IFAC history, we shall not dwell on this event. Unfortunately, there does not appear to be any archival record of the proceedings of this international colloquium, even though I have a set of preprints handed out to attendees at the celebration.

The year 1984 occurred during the transition period for Hungary. A Polish pope had been in the Vatican for five years. Solidarity was active in Poland. The Berlin Wall stood firm, but the "East Bloc" was beginning to crumble. Hungary was the leading "Eastern country" in the evolution of these states to democratic forms of government. There were signs of change everywhere when the IFAC family gathered for its ninth World Congress in Budapest.

Tibor Vamos was serving as IFAC president. A nationally prominent, erudite intellectual gentleman, Vamos was director of the Institute of Computing and Automation, the second-largest institute of the Hungarian Academy of Science, and had held major positions in IFAC since 1969. Two of his key associates in the institute, Janos Gertler and Laszlo Keviczky, provided significant support for the Congress, even though Gertler at that time was in the United States. The Congress attracted 1,157 participants from 44 countries; 1,014 papers were submitted, and 544 of them presented at the Congress. Panel discussions were emphasized at this meeting, and 38 such sessions were held.

Still another innovation, which was organized by Past President Luoto, was a set of 10 "industrial problem sessions",which addressed topics popular with industrial participants. Such topics as "Mill-Wide Control in the Pulp and Paper Industry, "Production Management of Small Orders in Steel Mills", and "How to Interface Human Factors in Automation Projects" were included.

Six plenary sessions included "Development of Systems Science: Past, Present and Future" by J. Zaborszky, "Control Theory in the '80s: Trends in Feedback Design" by P. Kokotovic, and "Flexible Manufacturing Systems" by H. Yoshikawa. The Yoshikawa paper was of great interest to the attendees since, by 1984, it was obvious that the Japanese had jumped to a dramatic worldwide lead in automation in manufacturing. 1984 marked the final year of the Japanese National Project "Flexible Manufacturing System Complex Provided with Laser". It represented the culmination of 12 years of effort on efficient use of automation in manufacturing. Most of the world's national economies had been heavily impacted by the Japanese success in this field. This is one of the classic examples of use of control technology appropriate to both social and economic needs of a nation.

Another interesting footnote from the Budapest Congress is that Professor Song Jian of the People's Republic of China was elected to IFAC's Council (formerly Executive Council) at the IFAC General Assembly meeting. Shortly thereafter, he had to drop out of IFAC activities due to new governmental responsibilities in China. He now is a member of the State Council and is chairman of the State Science and Technology Commission of the PRC. His successor, Professor Lu Yong- Zai, is currently IFAC president-elect.

1985 - Boston - Council meeting

After Brian Anderson had been selected as the IFAC President for the 1990 to 1993 term with the Congress in Sydney, he began a strategic examination of IFAC's future directions and a preliminary review of his efforts were discussed at the informal officers meeting prior to the Boston Council meeting. This effort was to have important implications for the future of IFAC but was not yet ready for wider consideration. Another planning initiative underway at this time was a "Committee for the Support of Control Engineering Education in Developing

Countries" led by L.F. Pau of France. Several IFAC NMOs are in developing countries so this emphasis was timely. In addition, there are were several developing countries with the potential to create IFAC NMOs that would benefit from appropriate help with control education assistance.

Progress had been made to create new prizes for triennial recognition of key achievements in the areas of control applications and to acknowledge prize papers by young (35 years old or less) authors at IFAC Congresses. Final wording of the criteria and citations was requested for full implementation in time for the next Congress.

There was a lot of activity in the publications area. The continuing IFAC/Pergamon Press relationship was progressing well, including ever growing income from that renewed contract. Revised guidelines for IFAC publications and meetings were prepared. AUTOMATICA's financial matters were brought under the Publications Managing Board (PUMB) jurisdiction that clarified further the respective roles of the journal Editorial Board and PUMB in the management of the journal. Technical and editorial judgements were strictly the responsibility of IFAC including its AUTOMATICA Editorial Board and Publications Committee while publications financial matters were the business of PUMB. None of this interfered with the NMO responsibilities for conduct of the technical meetings themselves. In fact, the National Organizing Committee of each meeting was relieved of many of the post-conference publications responsibilities. Meeting preprints still remained in the hands of the conference organizers.

1986 - Zurich - Council meeting

At this Council meeting in Zurich final approval was given for the four new IFAC Prizes based on detailed definitions and procedures for each of them: The IFAC Control Engineering Textbook Prize, the Young Author Prize, the Applications Paper Prize, and the Education Prize. The IFAC Policy Committee had prepared these details for Council consideration and adoption. The Policy Committee recommended that the Council consider formal recognition for people who have served at high levels within IFAC and exhibited an outstanding level of leadership in those positions. Council authorized creation of a concrete proposal for such recognition to be considered at the next Council meeting.

No-show authors were a problem at this time in IFAC's history and it was clear that some action was needed to ameliorate this problem. No-show authors had a negative impact on the conference itself and exhibited less than stellar professional behavior by potential authors. Several proposals were discussed but in the end it was the NOCs and IPCs of conferences that had to solve this problem. The Council did not take any concrete action at this time.

By the time of this Zurich Council meeting there were still two NMOs in the running to host the 1996 World Congress. It was decided, after a secret ballot, that the US NMO would host

this Congress and that Stephen Kahne from the USA would become Chair of the Executive Board and IFAC Vice President, and in due course would move on to the Presidency.

It was at this time that Brian Anderson's study of IFAC's potential future was discussed by the Council. One of his key recommendations was to do something to narrow the scope of IFAC's technical meetings - of course excluding its World Congresses that were designed to encompass the entire spectrum of IFAC's technical scope. A natural outcome of this would be to create more technical committees out of many of the working groups that had proliferated during the recent creation of the Technical Board. Another aspect of this matter was the relatively new publications program that had emerged from the Elsevier/IFAC contract overseen by the Publications Managing Board (PUMB). It was clear that new opportunities existed for strengthening IFAC's technical meetings through use of stronger IPCs and introduction of technical meeting editors for producing preprints and proceedings for each meeting. This would be one of the challenges of the incoming TB Chair Lennart Ljung of Sweden. Much more about these developments may be found in Chapter III on the TB in this book. The Council was asked to study the report and come prepared to the 1987 Council meeting to provide their inputs as the final step in this planning effort.

Some organizational changes in Pergamon Press were explained to the Council with assurance that they would have minimal impact on the IFAC publications operation. It was now clear that income from publications was steadily rising and that continued to strengthen IFAC's financial situation. The manner in which publications income for IFAC was being handled and appropriate legal advice assured the Council that there was no difficulty in this financial activity of IFAC. Copyright matters were also evolving smoothly and were handled largely by Pergamon Press as expected by IFAC. Of course IFAC's main goal was to ensure the rights of IFAC's authors were properly protected.

A new procedure for financial assistance of authors from developing countries was established. In addition there was some discussion of whether only NMO members of IFAC were eligible to host events especially created for developing countries. There was a belief that non-IFAC NMOs should also be able to host such events. The Council adopted this principle going forward. It was also decided that at the time of the Munich Congress in 1987 there should be a more concentrated study of IFAC strategic planning based on the written Brian Anderson report.

1987 - Munich - Council meeting

Professor Manfred Thoma, IFAC President in the 1984-1987 term, hosted the IFAC World Congress in Munich. In addition to the normal annual business of IFAC it was at this meeting that the Council discussed in more detail the Anderson paper on the future of IFAC. Comments on this report were presented at the Council meeting by some of the IFAC offi-

cers. Several of these comments led to improvements in procedures for technical meetings and some administration functions as well. Authority for approval of IFAC technical conference proposals devolved from the TB Chair to TB Vice-Chairs and it was requested that feedback from past conferences be more substantive than in the past. There was more emphasis on improving contents of various "procedures and guidelines" materials than in the past. This was consistent with the perceived requirement to involve more and younger contributors in the affairs of IFAC commensurate with its growth. Many of these younger people did not have the background needed to run IFAC conferences, and were in need of these more formal and prescriptive guidelines. The links between technical conference NOCs and IPCs and IFAC's TCs were strengthened to assure that the standing structure of the TB played a central role in organization and quality control of the technical conferences. The coordination role of the IFAC Secretariat was also strengthened to aid in support of the volunteer organizers. This task was always challenging, as new people were involved in organizing symposia, conferences and workshops. There was some debate about whether or not IFAC's procedures were too restrictive or were necessarily proscriptive to ensure meeting quality. The conclusion was that the balance between encouraging creativity and meeting expectations was about right.

It will be recalled that in the earliest days of IFAC, terminology and standards were central topics for the fledgling organization. There were still some remnants of these activities in the 1980s but the time had come to phase them out now that the control field had matured and international practices and terminology was no longer a topic of debate among NMO countries. The first step in this phasing out was to rename the "TC on Terminology and Standards" to "TC on Terminology". The next step would be to eliminate this TC.

Anderson's report had emphasized the importance of IFAC taking the lead in newer areas of technology, exemplified by computer control and automation. There is always a tendency for a large organization to follow unless adequate attention is paid to identifying and staying at the leading edge. The importance of industry involvement in technical meetings was also noted. So often the academic style of meetings with peer reviewed full technical paper submissions is incompatible with industrial practice. Panel discussions and plenary presentations without the requirement of previously submitted complete manuscripts is more in line with industrial constraints where the focus is more on presentation and active sharing of ideas rather than publication. IFAC was encouraged to be open to such adaptations in all their technical meetings. The third key point of the Anderson initiative was to maintain the truly international focus by refusing to consider political judgments as part of the discussions at IFAC meetings. The goal must be to explore the theory and implications of control and automation throughout the world and let others deal with political implications.

As noted elsewhere, the IFAC publications program had been created and then overseen by Robert Maxwell, owner and chairman of Pergamon Press. Since the first formal contract with Pergamon Press as the IFAC publisher in 1976 Maxwell had been a member of the IFAC Publications Managing Board (PUMB). In the present year (1987) he stepped away from it. Maxwell was a controversial figure in British politics, publishing, and sports team ownership, but his positive contribution to IFAC success in publications cannot be questioned. A new publications matter was brought to the Council for consideration. It would add a new journal to AUTOMATICA as a part of a potential family of IFAC journals. This was not received with much enthusiasm by George Axelby, the Editor of AUTOMATICA. This was the beginning of discussions to expand the IFAC journal publications program and was to be studied in detail prior to the next Council meeting. More about these discussions may be found in the Publications chapter of this history.

It was at this meeting that the death of Michel Cuenod of Switzerland was formally announced. Cuenod had been the longtime Treasurer of IFAC (1959-1981) and following his death in 1987 his family created the Michel Cuenod Fund to assist young engineers to attend IFAC technical events. Although the initial benefits were restricted to students in the Electrical Engineering Department at the Middle East Technical University in Ankara, eligibility eventually extended to students from developing countries worldwide. Cuenod had spent several years in the Ankara area working on a large cement plant design and operation. He developed a natural affinity for the Turkish community. Much later the funds were added to others under the IFAC Foundation umbrella, also designated for the same purpose. The new Treasurer, Professor Mohamed M. Mansour of Switzerland reported that with the growing income from publications IFAC's financial position was good and that the reserves of IFAC were 2.5 times the annual IFAC expenses. It was suggested that there should be 3 times the annual expenses as a long-term financial target.

It was also at this meeting that the problem of "no show" authors was noted to be a real impediment to conference integrity. Although this problem persisted for some time, it was eventually reduced in importance, in part by requiring that authors with accepted papers at conferences must pay registration fees in order to have their papers listed in the program and appear in post conference publications.

A couple of awards related matters also came before the Council. A proposal was introduced by Stephen Kahne to create the IFAC Outstanding Service Award. It was accepted and referred to the Policy Committee for formal definition. The IFAC Congress Applications Paper Prize selection process was proving to be more complicated than had been originally envisioned and again the Policy Committee was asked to consider and recommend any needed changes.

1987 - Munich - Congress

The tenth World Congress, under the leadership of Professor Dr. Manfred Thoma of Hanover, attracted 1,432 participants from 46 countries to the Bavarian capital; 583 papers were selected for presentation out of 1150 which were submitted. Each Congress introduces a new style and new feature of the event, and Munich was no exception. A significant innovation in Munich was the presentation of numerous (34) survey papers, obviously not all in Congress-wide plenary sessions. Another innovation followed the Congress, when a quite thorough analysis of interest and attendance was prepared by R. Isermann, chairman of the Congress International Program Committee.

According to Professor Isermann, the most popular session at the Congress was “Expert Systems in On-Line Control” with “Adaptive Control Applications”, “Expert Systems for Diagnosis and Performance Monitoring”, and “Use of AI-Methods in Control” coming in second. This is probably a reflection of the large turnout at the Congress from German industry.

Plenary topics included “Modern Developments in Industrial Automation” by P. Ernst and B. Phillipson, “The Roles of Information Technology in Systems Control” by S. Narita, “Discontinuous Control Systems” by V. Utkin, “Control Challenges of Spaceplanes, Stations, and Platforms” by E. Gottzein, and “Telerobotics” by T. Sheridan. Clearly, the emphasis in Munich was control applications.

Industrial problem sessions were, as a group, attended by about 25% of the attendees. This was a continuation of an innovation started in Budapest in 1984. Ten of these sessions were held, including such topics as: “User/Supplier/Academic Relationships”, “Interaction of Automation/Organization/Human Resources”, “Applicability of Advanced Control” and “Proper Planning and Administration as Effective Tools”.

1988 - Oulu - Council meeting

The Council meeting in Oulu reflected a maturation of IFAC from the founding group into a transition period leading to the second generation of IFAC leadership. Elections procedures were somewhat more formal. Special emphasis was on the identification of IFAC leaders from the so called “East Block” countries although participants from this region from the beginning of IFAC still did not have many opportunities to play leading roles. The IFAC President Boris Tamm was Rector of the Tallinn Polytechnic University in Estonia, which at that time was still part of the Soviet Union. But there were changes in the air and opportunities for greater influence within IFAC by control specialists from Eastern Europe were becoming possible. Tibor Vamos, former IFAC President and Gusztav Hencsey, IFAC Secretary, were tasked with helping to identify potential, possibly younger contributors from the East for potential leadership roles in IFAC in the coming triennium. The Elections Committee eagerly sought this input. As part of the devolution process mentioned in Anderson’s report noted

above it was decided that special tasks should be given to the two Technical Board Vice Chairs. One should be a member of the Council and one should Chair the Policy Committee. There had always been an issue with having too many Council members serving "without portfolio" and thus being less involved in IFAC affairs in their Council positions than seemed optimal.

Although IFAC finances were strong there was a feeling on the Council that a target of three times annual expenses as a surplus target would ensure stability even in the case of some unexpected costs. It was also noted that failure to raise subscription fees at all for several years might send a signal that the NMO contributions were not important. The very fact that the General Assembly only met triennially ran the risk of unproductive detachment between the NMOs and the IFAC leadership. Since the NMOs are the actual members of IFAC, the Council always needed to keep NMO involvement in the forefront of all IFAC activities. Continuing low costs of IFAC operations were attributed to ever improving productivity of the IFAC Secretariat and further enhanced by the acquisition of word processors.

Throughout IFAC's history constant diligence was needed to request and receive annual dues from all NMO countries. From time to time an occasional NMO would become delinquent in their fee payments and so membership, although trending up, would occasionally drop. This sometimes led to restricting Council membership, since the number of Council members is determined by the number of NMOs at the time of elections. All this is discussed in the Chapter II on the topic of NMOs in this history.

Now, after almost 30 years, an Outstanding Service Award was created to recognize those who had made significant contributions to the welfare of IFAC. In a scientific society such as IFAC it is easy to note the contributions of the most senior officers, but there are many others whose efforts have risen above the crowd and should be recognized. The first group of Outstanding Service Awardees recognized at the 1990 World Congress in Tallinn numbered 35, and it was anticipated that far fewer than that would be recognized at subsequent Congresses once the backlog of deserving candidates was handled. To support the growing awards portfolio a new standing committee, The Awards Committee, was created within the Executive Board structure.

Award considerations sometime lead to delicate discussions. One example of this is was the concept of a proposed "Platinum Award". This award was being considered in response to an offer from a South African company who had proposed to provide funding for such an award. Over several years there had been discussions of this possibility and in the end it was not accepted. Part of the problem was lack of clear definition of the criteria for the award. With IFAC's commitment not to be involved in political situations around the world there was also some concern about receiving funds from commercial organizations. Another award innovation was offered for use at the Tallinn Congress. Rather than simply announcing an

Applications Paper Prize for this Congress it was decided to identify two technical areas for which an Applications Paper Prizes were to be awarded. This designation appeared in the Congress Call for Papers for Tallinn and the areas of "automation in manufacturing" and "applications of artificial intelligence to real time control/supervision" were selected.

It was noted that four NMOs had approached the President about hosting the 1999 IFAC World Congress: Austria, China, Czechoslovakia, and Norway. The President, Boris Tamm, encouraged each of them to come to the 1989 Council meeting prepared to discuss their proposals and the four NMOs were reminded about the importance of having a strong Presidential candidate as part of their proposals.

It was becoming clear that although AUTOMATICA was thriving, there was growing need for a more extensive publication program to serve the controls community. The Publications Committee was encouraged to study this matter carefully and come to the next meeting with one or more proposals to enlarge the publication portfolio of IFAC consistent with retaining AUTOMATICA's status as the flagship journal of IFAC.

A major advance in the management of IFAC's technical meeting program was introduced by Vice President Lennart Ljung - the Master Plan for IFAC Symposia. The essence of this idea was for IFAC to identify technical areas that could benefit from periodic international conferences and encouragement of the NMOs to offer to host such meetings. Details of this concept may be found in the Technical Board portion of this history, Chapter III. This more formal approach was specifically for Symposia while letting Workshop proposals follow a more flexible proposal and execution structure. This structure also allowed IFAC to create a database that would be helpful in identifying technical areas of interest of individuals. This would be useful when seeking potential paper reviewers and International Program Committee (IPC) members. Designated Editors-in-Chief would oversee management of publications coming from IFAC's technical meetings. Pieter Eykhoff, a major contributor of publications innovations within IFAC was named Editor-in-Chief of the IFAC Workshop Proceedings program. More about these advances may be found in the Publications Chapter of this history.

1989 - Buenos Aires - Council meeting

For the first time, the IFAC Council met in South America, in Buenos Aires. It was noted that by now the new Secretariat in Laxenburg had been in place for a decade and that most of the problems incurred by IFAC before the move to Austria had been resolved. All work was progressing in an efficient and stable manner. As the Council reviewed the past years, the importance usefulness of the IFAC Newsletter was identified as a particularly important activity of the Secretariat. Since there are no individuals as members of IFAC, communication within the IFAC family posed a continuous challenge. The existence and availability to individuals of the IFAC Newsletter throughout all the NMOs was essential to the efficacy of the organization. Individual contributors were members of TCs and Working Groups and on NOCs and IPCs of IFAC's many technical meetings. Communications vehicles such as the Newsletter and Operating Guidelines are some of the resources available to individuals as they take on various leadership roles within IFAC. At this meeting, as at others, a discussion occurred of whether or not the time had come to establish an individual member category of involvement was raised and quite readily turned down. The basis of this initial decision at IFAC's founding needed to be occasionally restated and always resulted in an affirmation of the wisdom of that decision. NMOs did not want individuals to be distracted from their NMO membership by having an option to have an IFAC membership category for individuals. This argument would arise again about ten years hence when IFAC discussed and implemented the IFAC Fellow status for individual contributors.

Existence of the Master Plan initiated at the previous Council meeting was proving to enhance the role of the individual contributor as NMOs vied for the chance to host IFAC Symposia that were being proposed by the TCs. In fact, there were numerous instances when the TCs would try to encourage a particular NMO to host a master plan symposium in an NMO country to ensure appropriate geographical distribution throughout the world. It was at this meeting that the term "Conference" was introduced as still another form of IFAC meeting. Thus there were Symposia, Workshops, and Conferences where the latter referred to technical meetings jointly sponsored by IFAC and other scientific societies that were not part of the Master Plan. Other initiatives including publication of benchmark problems by the Theory TC and nominations procedures for TC memberships were discussed.

There had been occasional discussions about seeking UN funding to support some of the IFAC technical meetings, in particular to support IFAC meetings to be held in developing countries. UN funding most often required post-conference reporting and this proved difficult for IFAC to implement since its technical meetings were managed by individual NMOs and not by a central IFAC agency. The further possibility of UN funding seemed unlikely and as it turned out there was essentially no further income available from UN agencies.

Over the years there had been occasional discussions about the potential value of an IFAC history effort to assure that later generations would have a comprehensive understanding of IFAC's origins and development. Although it was generally viewed as a good idea, little came of this suggestion. Pieter Eykhoff's contribution "20 Years Old; 20 Years Young" published in AUTOMATICA in 1978 was a collection of history oriented papers both previously published in AUTOMATICA and later written by several of the IFAC founders. The authors included Past Presidents Chestnut, Gerecke, Nowacki and Luoto. Other contributors were Oldenberger, Axelby and Eykhoff. The attempts to continue this history documentation effort did not substantially materialize in any consistent manner even with the encouragement of successive Councils. As noted earlier, before the IFAC Secretariat moved to its permanent location in Austria, it appears that some important historical records were lost from the IFAC archives. This attempt to develop a more complete picture of IFAC's evolution was not much of a success either.

It was not until 2014 that a concerted effort to create "The IFAC Story", you are now reading would be commissioned and finally started with a projected completion date of 2017.

1990 - Tallinn - Council meeting

Council meetings at the Tallinn Congress had a more introspective style than some in the past. Following the Brian Anderson report in previous years a number of specific strategic matters were ready for discussion and were central to the incoming Council meeting in particular. Anderson was President at the time of the incoming Council meeting. After several occasions in which an NMO of a new member country never paid their dues and were terminated after two or three years it was decided to change the admission rules. Going forward, a new NMO was not officially added to the IFAC membership list until the first year's dues were paid. For some time the question of individual membership rather than NMO memberships was debated and always the old scheme was preferred. However, as it was foreseen that contacts could be made in the future with individuals by email, an IFAC Affiliates Program was created. This was most useful to inform people on selected mailing lists of coming IFAC events matched to a keyword list of their technical interests. This was very primitive at the start but it did add some personal connections with IFAC for contributors. This fit particularly well with the development of the Master Plan of Symposia series on specific technical topics.

A plethora of Working Groups had been developing to cover all the technical areas within IFAC's scope but this was becoming unwieldy and proving hard to staff. Leadership of working groups was viewed as not having the cache of TC Chair positions. During the Tallinn meetings, no resolution for this problem was found, but it would soon lead to a substantial expansion of the There was no resolution of this question at the time of the Tallinn meetings but recognition of the difficulty would soon lead to substantial expansion of the Technical

Committees and Technical Board hierarchy. It was already clear that 14 TCs could not handle the load of technical work to be done. With the Publications Managing Board fully operational and effective, there was a noticeable requirement need for IFAC's structure to enhance the role of publications matters and improve the symposia/publications interface with the Technical Board. After all, it was the output of the Technical Committee symposia/conferences/workshops that contributed to journal and proceedings publications, yet the technical side and the publications side of IFAC's leadership structure were both in the two major boards. Linkage between these boards was an issue needing to be addressed.

As was noted earlier a decision was taken by the Tallinn Congress organizers to restrict consideration for the Applications Paper Prize to two technical areas. The Technical Board determined that, after all, this decision might not be suitable so urged future Congress organizers not to make such restrictions. There was also a noticeable reduction of sales of technical meeting proceedings. The seeds were planted to get away from the production of hard copy proceedings volumes but at the time there was no obvious replacement for this manner of disseminating the technical results reported at various conferences.

Sensing the need for action in advancing the IFAC publications program, a task force called the "Journal Development Group" was created to bring forth a plan to expand the journal offerings of IFAC. This was stimulated by the need to accommodate the ever increasing number of contributions offered for publication by contributions both from IFAC's technical meetings and independently submitted. It turned out that this was the beginning of a new family of IFAC journals as described in the Publications Chapter of this history. Key contributors to this planning effort included Kahne, Gertler, Axelby, Eykhoff, Henscey, Guardabassi, Ljung, and Thoma.

A number of other topics of strategic importance were discussed including:

The need to improve the structure and management of all IFAC's technical meetings;

Providing new opportunities for individuals to contribute to the activities of IFAC;

Strengthening links to the NMOs especially as they host IFAC technical events;

Taking advantage of chances to meet with local technology leaders in the cities where IFAC holds its annual Council meetings;

Enhancing the effectiveness of individuals who serve on various IFAC committees;

Strengthening links to regional technical meetings;

Continuing the good results from the IFAC Affiliates Program;

Finding new ways for involvement of students and young researchers in various IFAC activities;

Improving involvement of industrial control engineers.

An overall goal is to ensure that IFAC's activities are supportive of and are coordinated with NMO activities and to minimize overlaps and conflicts where ever possible. It was also noted that IFAC needed to be prepared to create new TCs as new applications areas of control emerge. Automobile control was a contemporary example of where IFAC needed to take the initiative.

1990 - Tallinn - Congress

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Although IFAC's constitution prohibits IFAC from engaging in political activities, the organization of an IFAC Congress is surely affected by the conditions in the host country. Estonia in 1990 was at the forefront of change in Eastern Europe and the Soviet Union. IFAC President Academician Boris Tamm, rector of the Tallinn Technical University, was a nationally known leader in Estonia during these fast-changing, even revolutionary times. In the chaos, many potential Congress attendees were concerned about the country's stability in 1990 and chose not to attend. They missed one of the truly great IFAC Congresses. The outpouring of warmth and dedication displayed by the organizers was truly overwhelming during the Congress week. Perfect weather until just after the closing ceremony, followed by sudden rain, served as natural punctuation to this memorable event.

The small size of the town of Tallinn presented challenges to the organizers. The 1,072 attendees required food, lodging, and transportation, which strained the town's resources, but the Estonian organizers did a great job to accommodate the group. Out of 2,700 abstracts submitted for consideration (a practice since dropped, since full papers are now required for review by Congress organizers), 594 papers and four plenaries were presented.

The four plenary papers were "Appropriate Automation—Integrating Technical, Human, Organizational, Economic, and Cultural Factors" by T. Martin, J. Kirinen, J. Rijnsdorp, M. Rodd, and W. Rouse; "Analyzing Complexity and Performance in a Man-Made World: An Introduction to Discrete Event Dynamic Systems" by Y.C. Ho; "Genesis of Notions 'Criterion' and 'Extremization" by M. Aizerman; and "Educating Future Control Engineers" by W. Schaufelberger.

In his technical wrap-up of the Congress, IFAC Vice President Lennart Ljung noted that the great resurgent interest in adaptive control research (mentioned earlier in this article), which was evident in the 1970s and 1980s, had stabilized. Still, adaptive control topics were still the most numerous in Tallinn. Interest in non-linear theory was growing rapidly as was both

theory and possible application of discrete event dynamic systems. A relatively new approach to system optimization and performance modeling called “H-infinity theory” was growing in popularity and appeared to be making inroads into studies of robust control.

The unabated advances in computer technology continued to offer opportunities to realize control algorithms not possible with earlier-generation hardware and software. Continued interest in robotics was evident especially in new areas such as flexible structures.

But, in the midst of the substantial advances in control, the inexorable advances in social and economic progress in Estonia in 1990 dominate our memory of the week in Tallinn.

1991 - Swansea - Council meeting

Over the years, IFAC had benefitted from IFAC Council members who were later selected for high-level leadership positions in their respective governments. This usually occasionally led to the need for them to resign their IFAC positions. During the 1990-1993 triennium this occurred when the Council member Atsunobu Ichikawa from Japan had to withdraw from further IFAC involvement to head up the Japanese government civil service organization. In the middle 1980s Jian Song Jian was obligated to leave the Council to assume leadership of the science and technology activities in China. Even in the earliest days of IFAC (the early 1960s) the Council member from the Soviet Union, Boris Petrov, head of the Soviet space program, played an important role in IFAC until his USSR government duties required him to leave the IFAC leadership community. In each of these cases, IFAC’s reputation and progress greatly benefitted from their IFAC contributions at least for a brief period.

Publications, once again, was an important focus of the Council discussions in 1991 in Swansea. During the past previous year, Pergamon Press had been purchased by Elsevier. Care was taken to ensure that Elsevier would preserve the PUMB contract between Pergamon and IFAC in its entirety. In fact, based on detailed discussions between IFAC and Elsevier officials it was clear that Elsevier welcomed the IFAC association and that they were fully committed to carry on the work that had started in 1976. As part of the growing importance and stability of the publication of AUTOMATICA, a Deputy Editor-in-Chief, Huibert Kwakernaak, was appointed by mutual agreement of IFAC and Elsevier. George Axelby remained as the EiC of the journal. It was noted that after some early concern from the IFAC NMOs about the one-publisher scheme, by 1991 there were no significant concerns expressed by NMOs according to a survey conducted in the previous year. Following discussions in the Journal Development Group about the need to expand IFAC’s publication program with a new journal, a formal proposal was brought forth for Control Engineering Practice, proposed as the second official IFAC journal. The aim was to create a new journal that would readily welcome papers with an industrial applications and control engineering practice orientation. It is important to note that independently proffered papers were to be wel-

comed for consideration by the editorial team in addition to revised papers originating in IFAC technical meetings. The new journal would have a management and reporting structure similar to that of AUTOMATICA; the formal connection to IFAC would be through the IFAC Publications Committee. All aspects of the PUMB contract would hold for the new journal as well. More details may be found in the Publications Chapter. Introduction of Affiliated Journals rounded out the general proposal for an expanded family of IFAC journals. The historical jurisdiction of IFAC's responsibility for all matters editorial and intellectual and PUMB's devotion to business aspects of the publications program was maintained. It was also emphasized that the Pergamon commitment to publish all IFAC symposia proceedings would also be an obligation of Elsevier even though there were discussions about the financial feasibility of continuing this practice into the future. When the next six-year continuation of the PUMB contract was to be negotiated the question of proceedings publications would be addressed.

Another topic of concern was the effectiveness and continuation of the Policy Committee and the Administrative and Finance Committee. As part of the SWOT (strength, weakness, opportunity, and threat) analysis the role and fate of these two committees were questioned. One of the interesting facts that had emerged from the analysis was that rather than referring important policy questions to the Policy Committee, there was a tendency to refer such questions to special ad hoc committees and that such practice tended to undermine the remit of this standing committee. After substantial discussion it was decided to continue both committees but to be more sensitive to how policy matters are referred in the future.

The advent of the IFAC Affiliates Program led to some questions from some NMOs about how IFAC could handle the costs of such a program. Discussion centered on the benefits to NMOs for IFAC to maintain a list of individuals with well-defined technical interests who could be kept aware of coming planned technical events and participate not only as attendees but also as reviewers and organizers of these events. The Technical Committees were quite positive about this new resource. Some of the concerns probably had arisen because of inadequate marketing of the program to the NMOs. This was a relatively short lived concern that soon passed. At the same time the Technical Board was undergoing some restructuring under leadership of the TB Chair Lennart Ljung, and the new structure would also benefit from an active Affiliates Program. Still another suggestion for broadening of IFAC membership was to create some sort of Associate Member Organizations structure. These would not be NMOs but could be universities or other scientific societies with a lower status in IFAC. Nothing ever came of this suggestion at that time but about two decades later new forms of IFAC membership would be implemented with restricted member benefits while retaining the NMO style of membership.

IFAC was considering its role relative to growing regional conferences. The American Control Conference had existed in one form or another since the late 1950s. The European Control Conference was just getting started having a potential European Union base. Since so many of the IFAC NMOs were in Europe, there was potential for conflict between an ECC and various IFAC technical meetings. While being committed to avoiding political matters, IFAC was not encouraged by the personal nature of the initiation of the ECC and restrictions to EU countries as the focus of the planned periodic meetings. In an attempt to regularize the ECC/IFAC involvement several steps were taken. First, an agreement between IFAC and the American Automatic Control Council (the US NMO) was produced to be a possible template for a similar agreement with the ECC. Since the ECC was not based on NMOs from European countries there was asymmetry in the negotiations needed to achieve harmony among the affected agencies. The key issue was to minimize scheduling conflicts among possible IFAC meetings and the ECC itself. Since the ECC started out as simply a conference with its organizing committees, rather than a scientific federation with a periodic technical conference, the discussions were not straightforward. Later agreements with the Asian Control Conference would benefit from these early interactions with other regional conferences. More details may be found in Chapter III of this history.

This meeting saw the beginning of serious discussions of an IFAC Foundation. President-Elect Kahne had done a preliminary study of how such a foundation might work and how it could be associated with the Cuenod Trust Fund that was created several years earlier. International charitable foundations are complex legal entities and it was clear that much investigation would be necessary before any actual foundation might be created. Although there was extensive work to be done, and it would turn out that more than a decade would pass before an actual foundation was created, the Council was in favor of asking the Policy Committee to look in detail into possible models for such an entity.

1992 - Malaga - Council meeting

It was reported at the Council meeting in Malaga, Spain that much progress had been made dealing with various regional meetings throughout the world and that agreements were now in place for the ACC, ECC, ASCC, and LACC. Another holdover from earlier Council meetings was the no-show author matter. It was formally agreed that partial payment of registrations fees could be required at the time of final camera-ready paper submission if any IFAC conference wished to do that. This practice would have to be noted in the Call for Papers if it was to be required.

The political situation in Eastern Europe at this time made it very hard for control experts from those countries to travel into “hard currency” countries. The Council explicitly noted the value to potential contributors from these countries. If special efforts could be made to hold IFAC symposia in the Eastern countries that would help them generate hard currency

for IFAC fees as well as giving members of their NMOs more opportunity to attend IFAC events. Thus, even with the prohibition against taking actions for political purposes, remaining aware of political realities could help IFAC accomplish its overall mission to create and communicate scientific results in the control field throughout the world.

Much thought by IFAC VP Lennart Ljung and his team had been given to the question of TB reorganization and details were reviewed by the Council. After deliberations it was finally determined that both the Policy Committee and the Administration and Finance Committee were, indeed, necessary and their continuation was confirmed. The fine structure of national members was considered based on the fact that many developing or very small countries had a hard time mounting a robust member organization. It was suggested that maybe it would be possible to broaden the notion of member to include a small group of organizations from nearby countries to form sort of a regional member organization of IFAC. Even the possibility of more than one member organization from a given country was considered. Thus the question was considered of how "country" should be interpreted in such special cases. There was a great diversity of NMO types and this had been the case since the start of IFAC in the 1950s. Some were branches of government agencies, or university groupings, or corporate associations, or professional societies, etc. What was common to all was that they each represented control engineering interests nationwide in each country. The matter was referred to the Policy Committee for further study. Chapter V of this history on NMOs has more details. This particular period was a somewhat turbulent time in the history of numerous countries and membership issues for the following countries were discussed by the Council: Bulgaria, Russia, Egypt, Estonia, Slovenia, Ukraine, Latvia, Belorussia, Georgia, Kyrgyzstan, Azerbaijan, Morocco, and Pakistan. No progress was made to further change the concept of NMO and the restriction to one NMO per country remained in place.

Budget matters were always discussed at each Council meeting. Currency exchange rates were always in flux. IFAC's finances involved at least British Pounds, Austrian Schillings, and Swiss Francs due to the location of the IFAC Publisher in Great Britain, the IFAC Secretariat in Austria, and the IFAC Treasury in Switzerland. Income from sale of IFAC conference proceedings continued to decline as had been forecast so the contractual agreement dealing with conference proceedings between IFAC and its publisher no longer made sense to either party. Consequently, it was decided that after 1992 there would no longer be an obligation to have printed proceedings volumes for each IFAC technical meeting. Since all arrangements for proceedings for the 1993 Congress in Sydney had already been made, that Congress would be the last to produce proceedings in printed form. The financial impact on IFAC would be negligible since the proceedings sales numbers had dropped to an insignificant level. This was a major change in the established procedures for organizing IFAC technical meetings so major revisions were needed in the guidelines for organizing IFAC technical conferences.

By the time of the Sydney Congress the IFAC Affiliates program was fully implemented and was being well received by conference organizers. It was useful to address a targeted audience for Calls for Papers and to help structure the technical programs for the conferences. It was also giving individuals a more prominent role in the affairs of IFAC. Another sort of affiliation was being considered: Affiliated Journals. The hope was that the expanded number of IFAC related journals would be additional opportunities for authors to publish their revised conference papers in journals somehow related to IFAC. Because of the contractual relationship with the IFAC publisher, affiliations with Elsevier's own journals were the preferred candidates but other publisher's journals could be considered as well.

The executed contracts with the world's regional control conferences (ACC, LACC, ASCC, ECC) introduced some publications issues since several of those conferences had their own arrangements with proceedings publishers. Over time these were being worked out so that authors had a clear understanding of the copyright obligations in each case. One important aspect of these relationships was to ensure that the triennial IFAC Congress would not be in direct conflict with any of the regional meetings. In general, the key goals of any IFAC arrangement with co-sponsored meetings was to ensure quality control of papers accepted for these meetings and to ensure that IFAC was well represented on the IPCs of the meetings. IFAC's involvement with the other FIACC societies reduced any possible misunderstanding about publications policies with them. Proposed involvement with non-FIACC groups required closer examination to ensure that the IFAC presence helped assure high quality of these other meetings. This required full involvement with the conference IPCs in particular. Since IFAC was not involved in financial obligation of these co-sponsored meetings the main focus was on technical excellence.

There were some formalities associated with the restructuring of the Technical Board being overseen by the TB Chair Lennart Ljung. The details are to be found in Chapter III of this history but minor changes in the Constitution were also required and were readily handled by the Council and then the General Assembly. NMOs were kept up to date on these developments so the General Assembly vote needed to change the constitution were not anticipated to be contentious. Another item related to the General Assembly was the membership number requirement of the Constitution. As IFAC membership numbers changed from time to time, the number of Council members to be elected at each General Assembly meeting could, from time to time, be affected. It should be recalled from the Constitution that "The number of Ordinary Members (of the Council) shall be not less than one sixth nor more than one quarter of the total number of member organizations." To ensure the widest possible geographical representation on the Council it was always the upper limit that was the operative number. As long as the number of NMOs was between 44 and 51, the upper limit of Ordinary

members was 12. Since planning for technical meetings often started several years before the planned event, it was important that all formal changes did not interfere with the normal day-to-day business of the federation.

Although no formal structure for an IFAC Foundation had been established there continued to be strategic planning for an IFAC Foundation in the future. It was always understood that such a foundation would be of value to IFAC. One of the key requirements for actually creating such a foundation was a substantial initial donation. That was to occur but only a decade later.

There was lots of activity in the area of IFAC memberships in part due to changes in the European situation following the end of the Soviet Union. NMOs in Estonia, Slovenia, the Czech Republic, and the Slovak Republic had joined IFAC. Latvia, Croatia and Ukraine had been accepted as new members by postal ballot but had not yet paid their first year dues so were not authorized to vote at the 1993 General Assembly. An NMO from Macedonia was to be approved by the General Assembly and, having prepaid its dues would have full voting rights after the General Assembly vote. NMOs from Morocco, Pakistan, and Yugoslavia were to be terminated due to failure to pay required dues.

A notable event was announced to the Council when George Axelby retired from his post as Founding Editor-in-Chief of AUTOMATICA after establishing this first IFAC journal in 1969. Huibert Kwakernaak was to take that position with a stable Editorial Board and stable operation in general. Although Axelby would be greatly missed, the journal operation would continue with minimal disruption. Control Engineering Practice was well underway under the leadership of Michael Rodd. Serving as volunteer editor-in-chief of a scientific journal is a huge task and IFAC was fortunate to have strong leaders either in place or as highly qualified potential successors, as inevitable transitions were required from time to time. One of the goals of the one-publisher model was to ensure such smooth transitions whenever needed.

A question came up about the need for the informal meeting of officers that had been started when Yoshikazu Sawaragi was President in the 1978-1981 triennium. The purpose of this annual meeting at the IFAC Secretariat in Laxenburg was to prepare for discussions and to finalize the agenda of the coming Council meeting. Another important purpose of the meeting is to strengthen relations between IFAC and the Austrian government that helps to secure the office space for the Secretariat. It is understood that there are no decisions made at these meetings since management of the federation is the responsibility of the Council consistent with policies established by the General Assembly. There had been a question raised about whether or not this officer's meeting might usurp the Council's mandate. The discussion led to reaffirmation of the value of the informal officer's meeting and the matter was dropped.

As the Coordinating Committees and Masterplan for Symposia were settling into place there were a few formal adjustments needed to ensure smooth transition from the old form of the TB to the new one, the fine structure of which was still being refined. Some other formalities were needed to accommodate the new IFAC Journal, Control Engineering Practice.

With the start of the new triennium President Stephen Kahne had asked each Council member to come prepared to suggest strategic goals and ideas to be explored in the near future. Several suggestions were put on the table:

-More feedback was requested from NOC Chairs of IFAC technical events including statistical data about their just completed event. This will require changes in the application and reporting forms for each event and should help as longer-term plans are created for technical meetings in specific fields of control. Linkage between the TCs and NMOs are to be strengthened.

-Should there be a small fee for IFAC Affiliates that might stimulate ad hoc and short term activities among Affiliates?

-Being aware of the theory-practice gap, a long time concern for IFAC, requires more interactions with the control industry community.

-New NMOs in South East Asia should be identified and encouraged to join IFAC.

-Is there a danger of creating "too many" TCs that will become a management challenge or do the benefits of narrower TC scopes add enough value to mitigate the risks?

-How can IFAC's public image be improved? Published materials about IFAC should say "Come join us" rather than inhibiting potential new volunteers in IFAC's work.

-Would publication of benchmark problems help draw interest to the control field? Materials targeting graduate students and industrial researchers are one way to attract new people to the federation.

-There is a tendency for IFAC to follow rather than lead. How can we best remain abreast of the latest applications and theory developments? Is archiving previous results to be the main focus of IFAC or should we strive to anticipate new areas of research?

-Understanding that technologies within the scope of IFAC technical expertise underlies many current and pending technologies. How do we prepare to contribute to the new fields? What sort of continuing education should be stimulated and how can IFAC take the lead in these areas?

Such a list of forward-looking questions can be useful for the Council as it shapes the organization and activities of IFAC in the coming triennium. This list is not inconsistent with a sim-

ilar list generated by Brian Anderson's report to the Council a decade earlier. It was hoped that occasionally listing some of these items might influence future plans.

1993 - Sydney - Congress

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The control theorist Brian D.O. Anderson served as IFAC president from 1990 to 1993 and hosted the 12th Congress in Sydney. Some 1,200 attendees participated in sessions that included about 1,000 papers. It was at the Sydney Congress that the number of technical committees of IFAC multiplied by three, just as it had done in 1975. Forty-six technical committees were created and divided into nine coordinating units. This was intended to continue to broaden IFAC's role in automatic control and to provide new leadership opportunities for control scientists and engineers throughout the world. Nineteen countries now named chairmen of IFAC's technical committees.

There were five plenary papers at the Congress. W. Powers described "*Control Configured Automobiles in the 21st Century"*. D. Mayne and L. Polak lectured on "*Optimization Based Design and Control of Dynamic Systems"*. L. Ljung's talk was "*The Process of Identification"."*M. Brisk brought an industrial view to Process Control: Theories and Profile". The final plenary was *"Recent Developments in Digital Control Theory"*, by M. Araki.

The magnificent Sydney Opera House was the venue for the opening ceremonies, and the sessions and industrial exhibition was held in Sydney's modern conference center in the downtown area. This was the first IFAC Congress in the Southern Hemisphere, and once again reminded the attendees of the worldwide scope of IFAC and the robust nature of this organization, which had reached its 36th year in 1993.

A growing concern in the scientific community and within IFAC was a tendency for certain authors from certain countries unexpectedly not to show up to present their papers. So-called "no-show"authors are a significant burden for conference organizers, and various measures are being taken to resolve this problem. It continues to present a challenge to organizers of future Congresses.

1994 - Copenhagen - Council meeting

At the Copenhagen meeting of the Council it was noted that Past President Uolevi Luoto had passed away since the previous Council meeting in Sydney. During the Presidency of this Finnish engineer, the IFAC Secretariat was in transition from its original location in Germany to its permanent new home in Austria. During that interim period, President Luoto had arranged for temporary housing of the Secretariat at his company in Helsinki. Of course this added greatly to the burden of the President, but was essential for the continuing support to all IFAC volunteers. It was also announced that the Japanese Council member At-

sunobu Ichikawa needed to be replaced out of the normal triennial sequence because of his new Japanese government appointment (as noted earlier in this narrative).

IFAC formally withdrew from FIACC as was foreseen several years ago. Cordial relations with the FIACC societies had been achieved and there was no need to continue any sort of formal relationship. No substantive changes would be made in the communications and co-ordination with IFAC's sister societies. Following the extensive work of the previous VP-Technical Board Lennart Ljung, the new VP Vladimir Kucera carried on reorganization of the TB. This resulted in a total of 46 technical committees under the guidance of 9 Coordinating Committees as foreseen in the revised Constitution. It was anticipated that this flattened TB structure would work smoothly and reduce some of the coordination problems evident when many Working Groups existed in the technical board structure. Final adjustments of TC scopes were underway. It was reported that the IFAC Congress San Francisco IPC Chair Jose Cruz was prepared to make full use of the newly structured TB to create a strong technical program for the Congress in 1996. The key word listing as part of the Affiliates Program was proving very useful to help structure the paper submission and reviewing activities. It was also announced that for the first time IFAC Congress Proceedings would be in electronic form only, without printed proceedings volumes. It was reaffirmed that only full papers could be reviewed for all IFAC symposia and Congresses. And all TC Chairs could only be selected from countries with IFAC NMOs.

As the journal Control Engineering Practice (CEP) was in its early stages there was some experimentation going on including publishing abstracts of papers from all IFAC technical meetings. This would evolve into publishing only titles and authors of all such papers; then even that would end in the near future. After the successful launching of CEP the idea of a third IFAC journal was presented to the Council. The suggestion was not to create a new journal but to start to build a family of IFAC journals from the IFAC Publisher's stable of control related journals. The overall management of any such new additions would fit into the Publications Committee/ PUMB model that was proving so successful for AUTOMATICA and CEP. This notion of an IFAC family of journals became an action item for study by the President and PUMB Chair in the coming year.

Refinements in the operation of the Awards program continued, especially improving the detailed criteria for considering candidates of many of the awards. There were also attempts to describe the diversity of NMO structures that could be helpful as a guide to countries considering creation of an IFAC NMO. It was particularly unfortunate that the NMO of India, with a huge number of engineers in the control field, announced their plan to withdraw from IFAC membership. Even Canada indicated some difficulty in maintaining their membership but did manage to remain a member at the urging of the IFAC leadership.

As publication of conference proceedings in paper form were being phased out there was some concern that income to IFAC might be reduced but that did not seem to be a realistic concern. Income to IFAC always exceeded the guaranteed minimum stated in the PUMB contracts, and the move into the new world of electronic publications proceeded smoothly. As one might expect, the Council was somewhat worried about these substantial changes in the world of scientific publications due to IFAC's dependence on publications income. The model envisioned by the PUMB contract stood the test of time and continued to provide an excellent outlet for reporting the technical work of the IFAC community, while growing financial support for IFAC. The rather small core of publications volunteers within IFAC had proven to be excellent managers of this vital service to the control community. IFAC was well served by the IFAC publisher who had taken a worldwide leadership position in the new world of electronic publications.

Background work continued to study creation of an IFAC Foundation as the Cuenod Fund continued to provide limited support for a few students for their participation in IFAC conferences. It turned out that numerous financial and legal issues were to be understood before any substantial progress to create an IFAC Foundation could be reported. Once again the notion of charging a fee from NOCs of successful symposia was suggested, studied and dropped. This topic seemed to arise every decade or so and was always dropped after brief consideration. The standing model of NMO responsibility for the finances of IFAC technical meetings in their home country stood the test of time.

There was a noticeable increase of speed in the correspondence among Council members and other volunteers as email became available to many people and the usual one or two week written correspondence delays disappeared.

1995 - Sun City - Council meeting

The Council met for the first time on the continent of Africa, in Sun City, South Africa. The S. African NMO was a longtime active contributor to IFAC and several of its members had held senior level IFAC leadership roles but the politics of the country had interfered with their "normal" participation in IFAC so it was with great pride and satisfaction that they could now host a Council meeting. There had previously been several IFAC technical meetings in the country. For a complete list of all IFAC technical meetings see the IFAC Secretariat website.

As a way to improve the efficiency of the Congress year meetings of the General Assembly and in incoming and outgoing Council and major boards it was determined that very brief, formal meetings of the Council and Technical and Executive Boards would occur minutes after each General Assembly meeting to allow the work of the Federation to proceed during the Congress week. Formal appointments to various senior leadership positions were made

at these meetings based on nominations by the IFAC Elections Committee. Although this seems a minor point it had a strong positive impact by allowing newly elected experts to get involved in the management of the organization during the days of the Congress and in preparation for the regular meetings of these groups at the end of the Congress week. Future Congress organizers were advised to arrange the Congress week schedule to accommodate this requirement.

A task force on possible supplemental ways to raise funds for IFAC reported and, in the end, proposed new sources of funds including fees for IFAC symposia attendees and new publication revenue streams were not supported. A report on possible new forms of IFAC membership also did not lead to changes. It was observed that the coming massive changes in publications income sources through electronic publications were bound to have an important effect on IFAC's financial future but it was not yet readily predictable.

Some irregularities in meeting approval requirements were discussed and as had been the case in the past, IFAC was not particular tolerant of "out of rules" approvals. Over the years it had been found that adherence to well considered rules for sponsorship had served IFAC well, even if the proposers were not really satisfied. Quality of IFAC's meetings remained the main criterion for approvals. Support of NMOs continued to be a topic of discussion and great support by the Council. With publications remaining a key source of IFAC funding and care being needed to maintain journal quality, the idea of Affiliated Journals was discussed noting that a fledgling program did not seem to be making good progress. Much more about this can be found in the Publications Chapter. In contrast to the Affiliate Journals, the IFAC Affiliates program was very successful and allowed use of selected mailing lists to match proposed conferences to potentially interested attendees. This program was continually refined and found helpful.

With electronic media having obvious great potential to enhance IFAC's operations and meetings program, a task force was established to determine how IFAC should take advantage of these opportunities. Ideas for an IFAC Foundation continued to be addressed with limited success. Tax implications for IFAC played a major role in these discussions.

1996 - San Francisco - Council meeting

During his term in office, IFAC President Stephen Kahne had focused on the problem of no-show authors at IFAC events and, of course, at technical meetings of other societies as well. This matter had generated much discussion among many technical societies and had been highlighted in the IFAC Newsletter. The wide discussion of the topic appeared to have stemmed the tide of no-show authors, fortunately for all involved, and quickly diminished as it became less of a concern. The rapid improvement was owed to changes in conference registrations and paper submission policies. This also led to better training of conference orga-

nizers with the goal of improving quality of IFAC events A triennial training program was created, The largely by leaders of the Technical Board, helped form a triennial training program, to help newly elected members of the TB and TC Chairs become more familiar with IFAC standards that had evolved over the decades of conference organizing experience. The first of these formal training sessions occurred at the time of the San Francisco Congress and were planned to continue at each subsequent Congress.

As noted earlier this was the first IFAC Congress not to use printed Congress preprints and proceedings. There were limited numbers of preprint volumes available for use by attendees during the Congress since at that time there were no good mobile reading devices for the electronic versions of technical papers.

Restructuring of the Technical Board had been led by Lennart Ljung in his role as TB Chairman. This included use of the TB plus TC personnel serving as the Congress International Program Committee (IPC), it helped ensure that the Congress program reflected the full scope of IFAC's fields of interest.

The Nichols Medal and Congress Poster Award were presented at this Congress for the first time and some suggested refinements in criteria for these awards were discussed. An electronic communication Editor-in-Chief position was created and Juan A. de la Puente from Spain took the lead in this endeavor. Upgrading the electronic infrastructure of the Secretariat was approved as IFAC moved aggressively into the age of electronic communication. Publications using electronic media were growing in importance but the economic realities of this mode were yet not well understood. Because of the importance of publications income to IFAC, concern was expressed about potential impacts on IFAC publications activity. One of the values of the IFAC one-publisher scheme with Elsevier was that the financial viability of both organizations - IFAC and Elsevier - is based on successes in electronic publications. As one of the world's leading scientific publishers, Elsevier was committed to success in this field. The Publications Managing Board (PUMB) concentrated on these matters to the benefit of IFAC. The first ideas about an IFAC web page were mentioned with serious planning for IFAC electronic presence underway.

India unexpectedly dropped its IFAC membership. This was to be examined and hopefully soon repaired. During a discussion of IFAC finances at the General Assembly it was noted that both Swiss and Austrian audits of IFAC financial statements had always found them to be in excellent order. Although it might not be visible to NMOs, IFAC had always been particularly careful about finances. The incoming President Yong Zai Lu of China highlighted his hope that an IFAC Foundation could be established to help IFAC achieve its many goals well supported by a strong financial base.

At the time of the Incoming Council meeting in San Francisco the first training session for incoming IFAC officials had already taken place and was highly appreciated by all attendees.

1996 - San Francisco - Congress

For the first time in IFAC's history a World Congress was held for the second time in the country of one of its NMOs. By 1996, IFAC had had three Presidents from the United States. As part of the initial organizing details of IFAC, Harold Chestnut, IFAC's first President was not the host of the first IFAC Congress. That honor was given to Alexander Letov, IFAC's second president who hosted the first Congress in Moscow in 1960. Jack Lozier was host of the 1975 IFAC Congress in Cambridge/Boston. Stephen Kahne, IFAC's 14th President was host of the 13th World Congress in San Francisco.

For the previous decade or so, the American traditional venue for large control conferences has been in large urban hotels where all parallel sessions and plenary papers and essentially all meetings associated with the conference can be housed in one facility. A very large fraction of the attendees are given sponsored sleeping room rates and, because so many sleeping rooms are reserved in a block, other financial benefits are provided to conference organizers by the hotel. This differed from the Congress in 1975 in the Boston area where the Congress meetings were held in various Harvard and MIT facilities with attendees living in dormitories and hotels throughout the metro area. The 1996 IFAC Congress was held at the Marriott San Francisco Hotel in the middle of the city. This proved to be a popular choice as records were broken for IFAC Congresses with total attendance of more than 1,990 and 70 countries represented.

Professor President Stephen Kahne and his team decided to introduce electronic publication of preprints for the first time at an IFAC Congress. As a result there was no more need for the expensive postal services so prominent at earlier Congresses for shipping home many volumes of papers presented at the Congress. The disks fit into a briefcase!

Professor Jose B. Cruz, Jr. was IPC Chair and out of the 2,500 papers offered for presentation by authors from 64 countries, the IPC selected 1,500 to be presented in 204 regular and invited sessions and 43 poster sessions. Poster sessions were an innovation at IFAC Congresses and were enthusiastically received by attendees. In addition, the program also included 13 panel discussion sessions that were quite popular with the attendees.

The creation of Coordinating Committees during the previous triennia as part of IFAC's technical structure was an important new framework for the International Program Committee as it processed the record number of submissions.

As usual, technical highlights of the Congress were opening and plenary lectures. Six speakers addressed the IFAC '96 attendees in the opening and technical plenary sessions. Keynot-

er Dr. John B. Slaughter, President of Occidental College and a past Director of the US National Science Foundation, gave a thoughtful challenge to the control systems community to bring its superlative scientific and technological skills to bear on the problems and dilemmas that face our society. By now a tradition at IFAC Congresses was to have one plenary lecture per day, first thing in the morning. Plenary topics were selected to highlight contemporary advances in control. Professor Lotfi Zadeh presented some issues, contentions and perspectives of fuzzy control. Professor Brian Anderson, IFAC Past President, discussed some fundamental issues of identification, adaptive and nonlinear control. Professor Karl Astrom bridged theory and practice in his talk on tuning and adaptation. Hichiro Ido focused on current issues of plant management and control. Dr. William Stevens discussed the automated highway systems planned for the USA.

Several San Francisco musical groups provided entertainment throughout the Congress and a large fireworks display added excitement to the 4th of July evening activities in the city.

1997 - Fukuoka - Council meeting

The Council and related meetings took place in Fukuoka, Japan. Some progress was reported on the creation of IFAC related Foundations in China and Romania and discussions began led to understanding the relationship between these National IFAC Foundations and IFAC itself. Such foundations have rather complex legal constraints in the international community and care must had to be taken to avoid international legal difficulties. The Cuenod Trust Fund, named for the first IFAC Treasurer, had started as a source of travel funds for students from Turkey who had papers at IFAC meetings. It later expanded to make students from developing countries eligible for such travel funds. It was decided to highlight the availability of such funds as part of the Call for Papers at IFAC conferences. Hong Kong membership in IFAC was another example of complex international matters that were to be addressed by the Council after consultation with representatives of China and Hong Kong. Questions were raised about surplus funds resulting from IFAC Congresses and discussions began that would result in voluntary donations to IFAC from NMOs of Congresses when those Congresses generated a surplus.

Refinement of the Technical Board organization and operation continued from the previous Triennium including minor changes in the Symposium Master Plan. Feedback from previous symposia provided data that was useful to the TB as they determined which Symposia series needed special attention due to declining attendance and the rise of new topics. Special attention was being given to the creation or termination of a TC due to changes in the technical development of the control field. In particular, there had been some discussion about the need for a Standards Committee; it was finally decided not to proceed with formation of such a TC. A more formal set of criteria for TC Chair and Vice Chair appointments was imple-

mented using data on previous performance of individuals. There was to be more attention given to planned progression from Vice Chair to Chair positions in the future.

There was some progress in identifying journals suitable for affiliation with IFAC to augment the three IFAC Journals at this time - AUTOMATICA, Control Engineering Practice and Annual Reviews in Control. The IFAC Publisher committed to move into electronic publishing that would bring all IFAC Journals into the electronic publishing age. Although there was some concern about the financial implications of such a change it was understood by the Council that this was an inevitable change and that everyone was committed to ensure the technical and financial success to this move. There was a proposal to support an initiative from a Greek colleague to organize a "Year of Control and Automation 2000" that was eventually turned down since much of what was proposed was covered by the planned symposia and other technical meetings already part of IFACs plans in the current and next triennium.

There were three NMOs who had proposed to host the IFAC Congress in 2008 - Germany, Japan, and Korea - all of whom were invited to submit final proposals to be considered in 1998. In addition, the South African NMO informed the Council that they planned to submit a bid for the 2011 Congress.

Good progress was reported in the planning of the coming IFAC Congresses in Beijing, Barcelona and Prague. Early thoughts on the use of multimedia within the IFAC community were introduced but it was still very early in creation of an IFAC electronic infrastructure to support this. Discussions of industrial involvement revolved around expanded exhibitions, tutorials, panel discussions, and changes in paper submission requirements. Even the creation of virtual conferences was mentioned as one way to reduce travel expenses while exchanging technical ideas.

1998 - Nantes - Council meeting

There was good news about the Hong Kong NMO situation with a report that since the previous Council meeting, agreement was reached to maintain the Hong Kong NMO as a regular member of IFAC. This result was encompassed in the following resolution "The Hong Kong Institution of Engineers (HKIE) will remain a member of IFAC as the representative of the automatic control community of the Hong Kong Special Administrative Region of the People's Republic of China. The HKIE shall continue to have the same rights and obligations in IFAC as the other members of IFAC." Once again IFAC had successfully negotiated, at least at that time, a resolution for a potentially disruptive situation. Pedro Albertos and Stephen Kahne, IFAC's President-elect and Past President respectively, carried out the negotiations.

IFAC's financial picture continued to be stable and positive with publications income continuing to grow and to maintain levels substantially above the contractual annual minimum. Master Plan symposia were successful and clearly were benefiting from the framework for

these meetings as established during the previous triennium. Priority for joint sponsorship was given to a selected set of international organizations (many of whom were long time members of FIAAC) with exceptional situations authorized by the IFAC President. Formalization of these practices and requirements were continually being updated in guideline documents for the conduct of IFAC technical meetings. The Coordinating Committee structure was in place with annual reporting occurring routinely and in general the new structure was recognized as successful and helpful for the community.

One complication that continued to require careful attention was IFAC's role in the field of mechatronics. IFAC's entry into the important and rapidly growing field had been somewhat late and with publications restrictions in the IFAC publishing program barriers to entry were not simple ones. In Chapter III, describing the TB development there are important details about how this developed. In fact in the rapidly evolving field of automatic control in general, outside organizations continued to develop and could pose some competition to IFAC's progress as the leading international scientific organization in control. In principle, competition is good, but must be well managed. IFAC's commitment continued to be that IFAC would be the place to go to contribute to and keep up with technical developments over the entire spectrum of the field. The mechanism for doing this was to focus on quality of conferences and publications under the leadership of the world's experts in the control field. Remaining in the lead of the electronic publication evolution was one of the keys to such success. IFAC had always devoted close attention to identifying and benefitting from the best minds in the field and providing leadership opportunities for this select group of contributors. It was recognized as an honor to be selected for IFAC leadership roles and, as time progressed, competition for such roles grew. One indicator of this was the growing competition to host the triennial IFAC World Congresses. As the end of the 20th century approached this competition became more evident. Recognition of achievement was one component of this competition and more attention was being paid to refinement and clarification of existing award criteria and new ideas about a more robust award program. In addition, there was new awareness of the need for public relations activities especially as websites and other use of electronic media became more common. It was understood that such an effort would not only enhance the visibility of IFAC itself but could also be helpful to IFAC's NMOs in their home county. President-Elect Albertos spearheaded the planning for an enhanced public relations effort. Also helping this public effort were efforts to create national IFAC foundations in the UK and South Korea.

The transition to electronic publication of Congress proceedings was taking a bit longer than originally expected. It was noted that Proceedings of the 1996 San Francisco Congress, initially planned to be only in electronic form, had an active market for printed copies as well so the IFAC Publisher produced printed copies as requested. The affiliated journals program was slowly developing as is reported in Chapter IV. In the meantime, Elsevier was develop-

ing electronic resources to stimulate later electronic products as part of the IFAC portfolio. To be sure, their motivation was much greater than just IFAC's needs.

Continuing to focus on strengthening NMO relations, the Council decided that a regular part of the General Assembly activities at Congresses would include some social interactions among the GA delegates so that there is an opportunity for them to get to know each other and the IFAC officials as well. This would evolve into a reception preceding each GA meeting.

1999 - Beijing - Council meeting

Training sessions for CC and TC chairs had been well received when first done in San Francisco and were now part of the routine schedule of events at each Congress. They take place during the Congress week and facilitate initial efforts for the new cadre of TB leaders. Other recent initiatives such as the Affiliates program were doing well and IFAC cooperation with the various regional control conferences was progressing smoothly. Brief reports for IFAC Foundations in China, Japan, Romania and the UK were presented to the Council and already almost 200 travel grants were awarded to young authors and other NMOs were encouraged to create such funding sources. The IFAC Control Engineering Textbook Prize was renamed the Harold Chestnut IFAC Control Engineering Textbook Prize. The IFAC Website contains details of all awards including their evolution and names of all award winners. The awards management structure had recently been changed to create separate committees for nominations and for selection. This seemed to be working well but still needed further refinement to ensure that the best candidates for awards are identified and eventually properly recognized.

President Yong Zai Lu highlighted five areas he had emphasized during the past three years: making IFAC even more dynamic, keeping high quality without losing a view for emerging areas, having stable but flexible management of IFAC, focusing on industrial involvement, and maximizing the use of electronic facilities. There was encouragement that these areas be continued as important for the coming triennium. At this time the TB consisted of 9 Coordinating Committees and 45 Technical Committees and was working smoothly. There were eight international organizations with whom IFAC had sponsored technical meetings and in order to streamline such cooperation the incoming IFAC President was requested to communicate with these organizations to minimize any possible misunderstanding about IFAC requirements for such cooperation in the future. In particular, IFAC's publications obligations were often misunderstood by other societies and it was useful to have such potential problems understood from the outset of any cooperation in organizing and sponsoring technical meetings. One of the main changes to the TB was elimination of most Working Groups and for some of them to be elevated to TC status. Among other things this gave more visibility to the unit and its leadership (TC Chairs), going forward. It was hoped this would provide more visibility and support for TC leadership as they carried out their duties. It may be re-

called that at first the NMOs were not sure these changes would be a good thing, but quickly this change was appreciated by the NMOs and no further concerns expressed.

IFAC's finances are complicated by the need to use different currencies as noted earlier. These was even a suggestion that maybe the Seat of IFAC should be moved from Switzerland to Austria considering the changes that had occurred over the years. Finally, the only change was to establish a reporting format that emphasized the Euro for reporting financial results and designating annual fees for NMOs even though there was still a requirement to keep the Swiss Franc and British Pound for some of the actual transactions. The Seat of IFAC and treasury operation remained in Switzerland.

Some issues with the IFAC Publisher had emerged related to falling sales of printed proceedings, the number of printed journal subscriptions, and treatment of subscriptions for IFAC Affiliates, and general adherence to contractual details. It was becoming obvious that some aspects in IFAC publications would need to be revised in order to maintain a progressive and up to date program. The IFAC members of PUMB were requested to actively ensure that progress was made in these problem areas. There was plenty of good news about publications as well. By this time 40000 pages of conference proceedings were regularly published per triennium and income remained at a healthy level. Control Engineering Practice was just about at breakeven even after the format of this journal had moved to typeset from scanned lay sheets. It was already clear the electronic publication would soon take over from the printed journal format so the emphasis was on how to ensure the financial viability of this mode of publication.

Once again new types of IFAC memberships were mentioned, examined, and dropped as had occurred so often in the past. The IFAC membership concepts once again were found preferable to any suggested alternative. It seemed remarkable that the NMO membership style, created in the late 1950s during the Cold War, remained the preferred model for IFAC. The incoming IFAC President Pedro Albertos specifically noted that closer contact with the NMOs was one of his priorities in the coming triennium. There are several ways to accomplish this. One is to encourage all NMOs to be more active in identifying individuals to serve on IFAC's 45 TCs. The NMO/TC linkage is at the heart of IFAC's structure. Another is for NMOs to host IFAC technical events. The CC/TC training sessions at Congresses helps facilitate these opportunities. The growing use of the Internet enabled communications among the NMOs and TCs and it was foreseen that in the future even TCs can have their own Internet presence. It was suggested that the office of an "ombudsman" may be created to facilitate communication among various IFAC entities.

The role of IFAC leader, whether TC Chair or any other leadership position, in addition to being an honor, is an important responsibility within the IFAC community. Performance in these roles is used in the triennial nominations process for future leaders. It was also noted

that lack of performance could result in “mid-triennium” replacements in case that is needed. IFAC has been fortunate over the years to have dedicated, hard-working volunteers in most of its leadership positions.

Applications for IFAC Congresses in the future were becoming more competitive. In the old days there may have been two or three NMOs expressing interest in hosting a future Congress, but now more and more NMOs were announcing plans for competing. Plans were made to “tighten” and make more formal the actual competitive process. There was some thought to adjust the schedule, which could perhaps, lead to a shorter period of time between expressing interest and the actual Congress itself.

1999 - Beijing - Congress

> Note: The Congress write-ups preceding this one were written by the same author (Kahne) in 1996. The Congress write-ups beginning with the Beijing Congress were prepared by the organizers of their respective Congresses. Readers will see that these later write-ups have their own unique style and emphasize aspects of the Congresses thought important by the individual Congress organizers. The book authors thought it important to retain these individual writing styles.

As the last triennial IFAC World Congress of the 20th century, the 14th Congress, was held July 5-9 at the Beijing International Convention Center in Beijing, P. R. China. Historically, this was the first IFAC Congress held in a developing country, and shows the world that IFAC is a real international professional organization not only for developed countries. The Chinese NMO, the Chinese Association of Automation presented an excellent conference in terms of both technical content and organization. This IFAC Congress played an important role in promoting the development of control science and technology in a myriad of developing countries. It showed that IFAC as an international professional society plays an important role in promoting human civilization and supporting variety of technologies worldwide.

The Congress was attended by 1,466 registered participants, including 1,080 from outside the Chinese mainland, and 300 accompanying persons. A total of 59 countries and regions were represented. The IPC received 2,169 submissions from 68 countries and regions. 1,566 papers were accepted and 1,543 papers (1,266 lecture papers and 277 poster papers) from 59 countries and regions were included in the Final Program.

Countries and regions with the largest number of contributions:

Chinese Mainland	312
USA	173
Japan	146
France	94
UK	90
Canada	46
Australia	43
Spain	40
Hong Kong, China	38
Singapore	36
Korea	35
Russia	35
Brasil	22

In the course of five Congress days, 1,366 papers were presented in 215 lecture sessions and 46 poster sessions. The papers were clustered into 9 Congress Tracks grouped as follows: Manufacturing and Instrumentation, Design Methods, Systems and Signals, Life Support Systems, Systems Engineering and Management, Global and Educational Issues of Automation, Industrial Applications, Transportation and Vehicles, and Computer Control. The papers were arranged in 17 parallel sessions, with about 20% of the papers presented in 3 poster sessions that were well attended. As it turned out, the poster papers provided an even better opportunity to communicate with the audience and hence had its own advantage over the oral presentation. The poster sessions attracted many people and involved them in animated discussions.

Each Congress day started with a plenary talk given by control experts of international reputation. Y. Ho (USA) presented “Optimization - A Many Splendored Thing” which described optimization problems. It dealt with many approaches to solve optimization problems such as unconstrained and constrained problems, convex and non-convex optimization problems, dynamic constrained problems, stochastic optimization problems, and distributed problems. William Powers (USA) addressed “Automotive Vehicle Control Challenges in the 21st century” that proposed a direction to design future automotive vehicles for the next generation. He emphasized that future vehicles would be more “electrified” and designed by total systems approaches, involving new materials, alternative fuels, and new powertrains - all enabled by

modern control systems and design techniques. Petar Kokotovic (USA) described “Constructive Nonlinear Control: Progress in the 90’s”, which contained the overview of recursive design procedures and application examples. He reviewed several descriptive concepts of nonlinear control theory including Lyapunov stability, PR Lemma, Passivity, Small gain theorem, Optimal control problem, and Input-to-State-Stability. Other plenary lectures included “Some Recent Advances of Automatic Control in China” by Lei Guo (CN) and “Systems - Governing Principles and Multimedia” By T. Vamos (HU).

Seven Panel Discussions were organized on the following topics:

The Control Challenge in the 21st Century (Peter Groumpos, Pedro Albertos, Panos Antsaklis); Genetic Algorithms in Power System Optimizations: Current Application and Future Trends (Furong Li); Open Electricity Market (Shuti Fu, Farrokh Albuyeh, David Sun, Siaomin Bai); Air Traffic Control Issues in the Western Pacific Region (Stephen Kahne); Perspectives on Control (John Doyle); Neural Networks Applied to Diagnostics Estimation, Virtual Sensors and Classification (Kenneth Marko, Tom McAvoy); Failure of Intelligent Control Systems and Lessons Learnt (Ming Rao).

Before the Congress, on July 4, 1999, seven tutorial workshops were organized.

The Congress Banquet was held at the State Banquet Hall, the Great Hall of the People, at thein Tiananmen Square, which was about 10 km from the Congress site. Since the traffic in Beijing is generally congested in the evening, congress participants wondered how a couple thousand people could be transported smoothly during the rush hour. However, the traffic was not a problem at all because the organizing committee made special arrangements to block all traffic while a motorcade of approximately 40 buses carrying the congress participants was led by a police car to the State Banquet Hall.

The Congress was a great success on all accounts. However, only 1,366 papers (1,143 lecture papers and 223 poster papers) out of 1,543 papers in the Final Program were actually presented at the Congress. The difference comes from the 177 no-show papers, which is a quite significant portion, representing 11.47%. The no show percentage for lecture papers was 9.72%, and that for the poster papers were 19.49%. A measure for preventing no-show papers in the future seemed necessary.

2000 - Patras - Council meeting

The Council meeting in Patras, Greece took up several major issues that would impact IFAC long into the future. They included a substantial change in the scheduling of Congress venue/President selection procedures. Many of the initiatives discussed and implemented at earlier meetings had proceeded successfully, however, some had only been partially successful. A small number of NMOs were late with annual fee payments, leading to withdrawal of

membership for some of them. In other cases, potential NMOs would apply but never submit their first fee payment, thus not actually becoming IFAC members. There were instances where the TC Chair could not carry out the expected duties, and had to be replaced during the triennium. In such cases it was important to have a Vice Chair to take over the duties. IFAC had the opportunity to play an even more active role in the organization of co-sponsored events with the IFAC TCs.

A recurring source of concern was the IFAC Affiliated Journal program. This program was established as an additional source of publications outlets for IFAC authors, but seemed less effective than anticipated. Even with these challenges, it still attracted TCs into the IFAC Journal family and remained a goal worth pursuing Several of these journals eventually were added to the IFAC Journal list.

Milestone reports for the Coordinating Committees (CCs) met with mixed success and ideas for monographs or "professional briefs" continued to be considered but without much success. IFAC's web presence was growing but more slowly than earlier anticipated. A suggestion for cooperation in the robotics field had arisen from the 2004 Olympics committee in Athens but failed to gain traction within IFAC. To make sure that quality remained paramount in IFAC's growing portfolio of activities, it was a good thing that some ideas were weeded out. Careful selection of projects and improved feedback from on-going activities, all helped strengthen IFAC's leadership in the control field.

To cut down on the time it took between initial application and formal IFAC approval for the symposium and conferences, it was now possible to apply electronically. This was implemented under the leadership of Rolf Isermann. Collaboration between the Coordinating Committee chairs and IFAC Secretariat helped streamline the process. Consideration of topics and schedules was part of the decision-making process that helped maintain a good balance in the conference calendar. Having a detailed keyword list of technical interests among the IFAC Affiliates made it easier to appropriate associate the a subset of individuals with planned events. TCs were slowly coming online and creating websites for their committees. Mike Masten and Jozsef Bokor, refined and coordinated the TC scopes and titles. Occasionally a new TC was created with the two most recent examples being Mechatronics and Telematics. This was part of a systematic approach to tailoring the TB to fit current technical interests of the community within IFAC's scope.

Linkages between the TB and the Publications Committee were an important topic at this time since there are twin responsibilities of ensuring that high quality information was available for presentation at IFACs technical meetings and in IFAC journals. The possibility of publishing collections of plenary lectures, state-of-the-art summaries of selected topics and even position papers was discussed and anticipated but it would turn out that later electronic means for circulation of such material would be preferable to published books of such mate-

rials. As IFAC added new journals to its portfolio, especially Annual Reviews of Control, some means already existed for such contributions in addition to the occasional survey paper in one of the journals. The transition between conference proceedings on paper and in electronic form continued with considerable support for continuing with paper copies. It was noted that younger members of the IFAC community were quick to embrace the newer electronic formats. Since one of the IFAC objectives was to better serve and encourage young people to become involved, the leadership was pushing for quicker commitment to electronic means, especially CDs. A new position of Electronic Media Editor was created and preparation for changes to the IFAC Constitution to handle these changes were prepared. With all the potential changes to IFAC publications matter a more comprehensive study was ordered for consideration in the coming year. Additions to the awards program were initiated including a focus on industrial contributions.

President Albertos had initiated a strategic discussion about how the President and Congress venue is selected. The two issues to be addressed were: 1. The link between the President's nationality and the Congress venue, and 2. Reduction of lead time between determination of the President and the Congress venue from 9 years to 6 years. The IFAC tradition followed without exception since the founding was that the Congress venue was always in the home country of the selected President. Upon review it was determined that this tradition had worked successfully since the founding and should not be changed. The question of lead-time was raised largely because of the paucity of eligible candidates for President with the 9 year lead-time. This was effectively a 15-year Council member obligation; one triennium to establish eligibility, one triennium in what was typically a VP position, one triennium as President-Elect, one triennium as President and one triennium as Past-President. The proposal was to reduce this to a 12-year obligation partially to reflect the efficiencies realized in IFAC management due to modern electronic communications. Countering this argument was the realization that large conference facilities rental lead times were getting longer for meetings that were the size of current IFAC Congresses. It also required constitutional changes that affected the eligibility criteria for the President-elect position. Going forward a President-elect would not be required to have previously served as a member of the Council. There was some controversy surrounding this proposal but in the end it was adopted and the 6-year schedule has been followed ever since. The General Assembly approved of this change by postal ballot. Thus in this triennium there was no conflict with the Congress venue and President, as the calendar shifted to the new version.

2001 - Arlington - Council meeting

At the Arlington (USA) meeting of the Council a major activity was initiated in preparation for IFAC's 50th anniversary. Rolf Isermann reported that the German NMO invites IFAC to hold an event in 2007 in Heidelberg where IFAC had been founded in the late 1950s. Iser-

mann would serve as the host for the celebration. Past President and Advisor Stephen Kahne will head a task force to plan the overall anniversary including the celebration itself. Members of the Task Force in addition to Kahne were Tibor Vamos, Past President and Advisor, Mohamed M. Mansour, Past Treasurer and Advisor, and Rolf Isermann, Vice President and Chair of the Technical Board. The Task Force promised to propose to Council at a future meeting a comprehensive plan for the anniversary. President Albertos encouraged the Task Force to expand its membership as needed and to expect full support from the Council as plans evolve over the coming years.

More efforts had been underway to create milestone documents and professional briefs coming from Technical Board initiatives. In order to stimulate industrial activities within IFAC, the Industrial Achievement Award was created during the past year. An IFAC Ombudsman position is being proposed to open IFAC more to individuals who may feel somewhat distant from IFAC leadership initiatives. This innovation was to be examined closely in the coming months to determine its effectiveness and impact. IFAC's web presence continues to be enhanced but still is in its early stages of maturity. Even TCs are starting to develop web pages but the technology is not yet widespread enough to have a major impact. More help will be provided from the IFAC Secretariat to help standardize TC web pages. This would eventually lead to employment of a wemaster within the IFAC Secretariat. There was growing encouragement from the leadership for all IFAC entities to have suitable web presence. As usual the IFAC-Elsevier contract renewal process proceeded smoothly in its most recent reincarnation. The new contract was effective at the end of 2002.

Additional information would be helpful to IPCs for the various technical meetings being planned by various TCs and NMO hosts. In order to maintain high quality of each event, there are a number of requirements mandated by IFAC but without more detailed instructions for organizers it is easy for a new IPC to overlook something. With new electronic support available from the Secretariat, several of the routine functions familiar to experienced organizers can be made available to less experienced volunteers as well. The Policy Committee will put together a clear enumeration and chronology as a framework for organizing these meetings. The Publications Committee continued to struggle with making the affiliated journals program more effective. The per-paper fee for use of IFAC papers was to be replaced by an annual fee for each affiliated journal.

At the same time two of the existing affiliated journals are proposed for elevation to official IFAC journals as described in Chapter IV of this history. As part of the effort to encompass mechatronics into IFAC's main, it was proposed to bring in an existing mechatronics journal as an affiliated journal.

An important way to communicate with all IFAC volunteers would be to create a password protected part of the IFAC website for distribution of meeting agendae and minutes and oth-

er administration documents as needed. The savings of mailing costs will result in significant financial benefits. This will also be very useful for the triennial selection of future IFAC presidents and congress venues. The number of NMOs who are indicating interest in hosting the Congress was growing and more formal procedures need to be used to make the best selection.

2002 - Barcelona - Council meeting

Since IFAC's members are national organizations rather than individuals it was felt that inadequate attention was being paid to the individuals who have made substantial contributions to the control field including their leadership within IFAC. In order to provide suitable recognition, the designation "IFAC Fellow" was proposed and detailed criteria and procedures were to be worked out in the coming year. This new recognition should also be helpful in attracting new leaders to our federation.

The experiment to create an ombudsman position seemed to be of little interest to anyone so was seen as less useful than expected. Website visibility was increasing slowly and needed more work to become an effective means to enhance the public image of IFAC. Everyone was learning how to take advantage of this new technology, especially the IFAC Secretariat. This not only had implications for public relations but also to improve efficiency of meeting organization and centralized support services for IFAC's many National Organizing Committees and International Program Committees. The role of the Electronic Media Editor was growing in importance as IFAC moved into the digital age.

The IFAC Textbook Prize had been created a few years back. Through a recent financial donation from the family of Harold Chestnut, IFAC's first President, this prize is to be renamed as the Harold Chestnut Control Engineering Textbook Prize.

It had become common for NMOs who anticipated eventually bidding to host an IFAC Congress to arrange small receptions for selected guests during the time of the IFAC Congress. It gave the NMO a chance to introduce itself to a group of Congress attendees who might later be in a position to support a Congress bid in their country. In the past there were only one or two NMOs who wanted that kind of exposure but as the new century emerged more and more NMOs saw the potential of hosting a Congress and so more and more NMOs tried to find a time and place for a hosted reception at each Congress. At the Barcelona Congress a new feature was added wherein the Congress host cooperated with these several hosts to have a coordinated "Friendship Evening" where each of the NMOs could host small receptions at a common location all at the same time. This could be done in one large ballroom or in several smaller rooms in the same hotel or conference facility so invited guests of these NMO receptions would be able to circulate among the receptions at a time reserved for all the receptions. This initiative was first suggested by members of the Italian NMO and then

was adopted by the Spanish NMO and proved very effective. It set a precedent followed by successive Congress organizers going forward and became a regular part of the Congress week.

After a long history of co-sponsoring technical meetings on a routine basis with outside organizations, by this time only two had remained in this special category - IMEKO and IFIP. Other occasional co-sponsorships required case-by-case scrutiny by the President prior to authorization for co-sponsorship.

At the time of this Congress there existed several funds that were used to help authors present papers at IFAC events. They include the Michel Cuenod Fund that was the original funding account for such purposes. Former President Manfred Thoma chaired that fund and he will examine all the funding accounts and seek legal guidance about combining several such funds into a potential IFAC Foundation. These funds were still quite small but if IFAC were to establish a more substantial charitable foundation it will be good to have the smaller accounts ready to be incorporated into one overall fund.

Newly elected TB Chair, Michael Masten had been working with his predecessor Rolf Isermann to refine and codify the responsibilities of various TB leadership positions and incorporated these matters into the ongoing TC/CC training sessions that had successfully been initiated at the 1996 Congress. In addition all aspects of the electronic presence of the TCs and CCs had improved over the past several years and were now viewed as essential for the effective operation of TB activities. Firming up membership rolls of the TCs were firmed up. and helped ensure that successive technical meetings of IFAC benefitted from previous experience through feedback from attendees and data collection from these meetings. More improvements were to be made to ensure that late breaking technical developments could be presented at the technical conferences without being delayed by the standard peer-review of submitted papers. This seemed to be a daunting problem and needed to be studied. To overcome the lingering problem of no-show authors there was some discussion of a black-list system to identify unreliable authors who were known to routinely violate the no-show standards. No firm decisions were reached on this matter.

A more formal approach to Congress venue and President candidate selection was announced involving a two stage process. At the Council meeting in the year following a Congress any NMO could present brief introductions from which a selection of finalists would was made by the Council. At the Council meeting in the following year more robust proposals were made by the finalists would be made and the Council would select the Congress venue and President candidate. This would reduce the total effort required by not requiring NMOs to create robust proposals if they had little chance of success as determined based on the brief presentations.in the previous year.

The 15th Congress of IFAC was held in Barcelona from July 21 to 26, 2002. It was an exciting week during which scientists and engineers from all over the world had the opportunity to present new research findings and new applications, and discuss with each other the current and future developments of Automatic Control.

The number of registered participants was 2,011, coming from 66 countries in all continents. They actively contributed to a successful technical program by presenting research papers, taking part in discussions, and exchanging fruitful ideas in many ways. About fifty percent of them came from Europe, with North America, Asia, and South America following. The Congress week was preceded by two days of tutorial workshops on eleven different topics, which that were attended by a total of 184 participants. Tutorial workshops are one of the best ways to get acquainted with a technical subject by receiving first class carefully tailored information from the world's leading specialists. The technical program of the Congress included seven plenary lectures given by prominent experts in control theory, industrial applications, robotics, social aspects of automation, computer technology, and control education. The plenaries were well attended, from eight to twelve hundred participants each. This is a good indication of the interest that these topics raise in the automatic control community.

Six milestone sessions, new in this Congress, provided insight into the current state and future directions of research in specific areas of automatic control - manufacturing and instrumentation, design methods, biological systems, social impact of automation, industrial applications, and computer control.

The core of the Congress was centered around more than 1,600 papers, presented by their authors in 240 oral sessions and 12 poster sessions. These contributions covered all technical areas of control, and provided an accurate picture of the state of the theory, technology and applications of automatic control at that time. The International Program Committee had selected 1,757 papers for acceptance presentation out of the 2,512 submissions received.

Countries with the largest number of participants

Spain	254
United States	184
Japan	152
France	149
United Kingdom	145
Italy	119

Germany	114
Sweden	81
Republic of Korea	53
Brazil	45
Canada	44
China	44
Australia	42
Mexico	42
Russian Federation	42
Poland	34
Finland	33
Netherlands	32
Belgium	30
Portugal	28

For the first time in an IFAC Congress, an Internet-based computer system was used for paper submission and review. This resulted in reduced paperwork and improved flexibility for assigning papers to technical areas, performing additional reviews, and other useful activities. The amount of information available to the IPC members was greatly extended, enabling much better visibility of the paper review and selection process.

As in all events of this size, some authors were not able to present their papers. However, the number of non-presented papers was only seven percent of the Congress program, which shows an improvement over previous IFAC Congresses.

There were also eight fruitful panel discussions on a variety of control-related topics. In particular, the panel discussions on “Future Directions of Automatic Control”, and on “Role of Automatic Control in the IT Era”, had more than one hundred and thirty attendees each, with some others following closely. In addition to classical oral and poster sessions and panel discussions (called the “live track” of the Congress), a virtual track was organized.

The virtual track allowed registered participants to take part in remote discussions on the Internet. There were two kinds of virtual discussions:

1. Paper pre-discussion: Some selected papers were posted on a website for preliminary discussion before the Congress;

2. Open forums: These were discussions on selected topics, started by a moderator and followed by a live panel discussion in the Congress week.

A total of 100 papers were posted for pre-discussion before the Congress week. There were also 5 open forums, which were connected to panel discussions during the Congress week. Unfortunately, the participation in this activity was rather low, maybe due to the novelty of this kind of interaction with the authors and other members of the scientific community. Another possible source of inhibition may be the poor support for mathematical notation that could be found at that time in web forms.

For the first time 16 scientists from developing countries, who had an accepted paper at the IFAC World Congress Barcelona '02, received financial support by the Michel Cuenod Trust Fund. Due to the support totaling EUR 12,800 such a large number of mainly young scientists from 9 developing countries could participate in this important event. As may be recalled the Fund was established 15 years prior, at the 10th IFAC World Congress in Munich 1987, following the last will of Michel Cuenod, a former treasurer of IFAC for 21 years. More details about this fund, later to be incorporated into the IFAC Foundation.

2003 - Rotterdam - Council meeting

This year marked the 25th anniversary of the IFAC Secretariat in Austria. The stability and growth of IFAC in these 25 years had greatly benefitted from having a permanent home in Laxenburg and a permanent staff of professional administrators. The Council acknowledged this achievement with great appreciation. It was also noted that the training session held in Barcelona had already shown its value by the effective working of the TB even with many new people in leadership positions.

It is not unusual for IFAC to think about emerging areas of potential future importance during the first year of a new presidency and this was the case in Rotterdam at the time of the Council and related meeting. One of IFAC's major Master Plan Symposia was held at the same time - the "IFAC Symposium on System Identification" and in addition to TB and TC members there were several other experts that participated in this emerging areas activity. The technical areas identified as having great potential were:

-Hybrid and discrete event systems

-Distributed control especially in wireless communication technology

-Nonlinear control to overcome linear model limitations

-Sensors and actuators including MEMS devices

-Subsystem integration to achieve overall optimization

-Learning control systems and AI

-Autonomous robots and vehicles

-Fault detection and predictive maintenance

-Human-machine collaboration

-Sensors for biological application

-Automotive control

-Nano- and micro-systems control

These technical areas were to be important drivers for IFAC's coming years of conferences and publications.

With the coming IFAC 50th anniversary several projects were identified as potential components of a comprehensive set of history related activities. Although not all these activities would be realized in the years leading up to the anniversary itself in Fall 2006, most would lead to significant ongoing activities to enhance the future of IFAC. The areas identified for development are:

-The celebration event in Heidelberg in September 2006

-Online access to IFAC's technical output of scientific achievements

-The identification of significant early textbooks in control

-A time line of control history

-Enhanced access to educational materials in the control field

-The history of IFAC including its leadership and NMOs-An IFAC Foundation

The Council was informed by IFAC Advisor Stephen Kahne that an anonymous donor had agreed to donate $500,000 for the purpose of supporting certain projects to enhance IFACs stated mission and so new urgency now existed to create the IFAC Foundation as noted in the IFAC anniversary plans. Legal and financial issues were to be investigated by Lino Guzzella, the IFAC Treasurer, in preparation for a formal proposal for a Foundation and receipt of the gift. Pedro Albertos, IFAC Past President began to formulate a program plan for the Foundation. Preliminary details about the Heidelberg celebration were given by Rolf Isermann including ideas for invited attendees and the actual program of the event scheduled for September 15, 2006.

In Rotterdam the Council made the final commitment to recognize extraordinary contributions to the control field and to IFAC by creating the rank of "IFAC Fellow" for selected individuals. They will be selected through a formal vetting process, approved by the IFAC Council, and initiated with an award ceremony at the Prague Congress of IFAC in 2005.

There was more specific notice given that the workshop and conference printed proceedings were becoming financially unsustainable and that plans were underway to eliminate hard copy versions of this material. Plans were also announced to make such materials available online with detailed information to follow.

2004 - St. Petersburg - Council meeting

The last time a Council meeting had been held in Russia was in 1960 and so the invitation to hold the 2004 Council meeting in St. Petersburg was somewhat of a milestone for IFAC. To be precise, the Tallinn Council meeting in Estonia occurred in 1990 during the transition period in the USSR. The end of the USSR actually occurred soon after the 1990 Congress so it is true that the IFAC Council meeting in 1990 was in the Soviet Union. Since the end of the USSR there had been a rather low level of IFAC activity in Russia when compared with the first decades of IFAC. It should be recalled that the second IFAC President was the Russian Alexander Letov. Of course he was the candidate of the USSR NMO of IFAC.

By 2004 all of the IFAC TCs had operational websites with some more active than others although essentially all TCs had at least one technical event per triennium. Workshop proceedings were no longer published as envisioned in previous meetings. For the symposia and conferences there are improved guidelines to help organizers, especially with the details of IFAC's publication program and the obligations it places on meeting organizers. Feedback from meeting organizers has noted that the publications part of meeting organization was particularly complex. For this reason, work was starting on conference registration and publications software that will provide integrated software support for all meeting NOCs. Major work of the TCs and CCs is program support for the coming World Congress and that also has improving electronic support as for other IFAC meetings. It takes time to refine such support software but it improves each time it is used for a particular meeting. Another challenge is that the hardware and software support advances all the time, so some technical details of the publications changes as time goes on. For example, it was to be that at the Prague Congress in 2005 the that electronic medium was to be DVDs where the Barcelona Proceedings in 2002 was available on CD-ROM. Great care was taken to maintain high standards during these transitions. Not only was high quality an enduring goal of all activities of IFAC, also the high quality publications of the Federation contributed a significant percentage of IFAC's annual income. System maintenance had become a regular item in IFAC's budget.

All details of the IFAC Fellows program were now in place and vetting of the first persons to be considered candidates for the rank is underway. It was envisioned that the first class of Fellows would be particularly large in order to recognize major contributors with long history of outstanding performance and after that only something like ten per year would be so recognized. Introduction of "Friendship Evenings" was mentioned in previous paragraphs and the enduring model seems to be that the host of the following Congress would have a re-

ception apart from the Friendship Evening and all other NMOs who wished to host a smaller reception would use the Friendship Evening time slot for those receptions. That was announced for the 2005 Congress in Prague.

2005 - Prague - Council meeting

It seemed that much of the time there are one or two new NMOs in the process of joining IFAC and one or two so far behind in their fees payments that they are in danger of being dropped from membership. Thus the actual membership number does not change much from Congress to Congress. In Prague in 2005, the membership was at 49. The Prague Congress had IFAC's largest attendance up to that time. Some of this growth could be attributable to improved registration procedures but there was as yet not much electronic support that could combine paper submissions and registration software that would make the entire procedure more efficient. That would be addressed in the coming triennium.

With the elimination of Workshop Proceedings being published by Elsevier, organizers of workshops had to make their own arrangements to produce materials for their meeting. Post Workshop distribution of information from the meeting is also the responsibility of the organizers. Other changes were either in place or coming as the Secretariat became more familiar with the possibilities of their new computer and communication infrastructure. Details include the use of an outside software expert, database integration so that the Affiliates database was more useful for NOCs of IFAC technical meetings. Centralized help for Congress organizers was also becoming possible and especially the IPC functions of Congresses were now to be mapped to the structure of the TB. Congress IPCs are essentially the TB itself.

As noted earlier, the procedure for Congress/President selection had evolved from a less formal interaction among potential candidates to a more formal style of operation. After some experimentation with the two stage procedure it was decided to use this procedure for all future selection cycles as long as there were candidate/venue preliminary proposals from more than two NMOs. So Congress venue/Presidential candidate bids will become standing items on Council agendae during the first and second year following each triennial Congress.

The regional control conferences in Asia (ASCC), Europe (ECC), Latin America (LACC), and the United States(ACC) had become a regular part of the IFAC meeting calendar according to agreements between each of them and IFAC. The question was raised about creating a regional conference in Africa with a similar arrangement with IFAC. The proposal emanated from South Africa where IFAC's South African NMO had a well-established periodic control conference that would form the basis of an African Regional Control Conference. There was no continent-wide control organization, unlike the other regions of the world, and so the Council believed it was unwise to support the South African initiative at that time. The Council preferred to consider such a proposal only when there was a true regional organization to

be the host of control activities including a regional conference. The TB was asked to assist in this effort if requested by various national organizations in Africa.

With the first IFAC Fellows selection completed several refinements were proposed and incorporated into succeeding selections. Since there was a backlog of excellent candidates for the first group of IFAC Fellows, 30 were selected by the Council and there was a formal award ceremony to make the presentations during the Congress week. It was envisioned that only about half as many would be selected per triennium in the future using the refined criteria.

With the announcement of the major gift to be available in the near future extensive work had been done to prepare the legal framework for an IFAC Foundation. There had been discussions for more than a decade about such a foundation and the Cuenod Trust Fund, in the meantime, did provide some funding to a few IFAC authors from developing countries we as was mentioned earlier. As had been envisioned from the beginning, it would take a major gift to set in motion the formal/legal basis of an IFAC Foundation that would be created in Switzerland, the seat of IFAC and home country of IFAC financial operations, bank accounts, and Treasurer.

The plan was to integrate the Cuenod Trust Fund into the new IFAC Foundation and to make provision for separate charitable gifts within the Foundation if they became available. Extensive legal paperwork was prepared, Trustees appointed and appropriate auditing and other financial controls established. Documents had to be prepared in German, notarized documents signed by Trustees and banks in Zurich used to hold assets, all according to Swiss law. The Council reviewed all this and made the commitment to complete all formal details by the end of 2005. The first Board of Trustees was appointed consisting of Wook Kwon, Vladimir Kucera, and Lino Guzzella as ex-officio members (IFAC President, Past President and Treasurer, respectively) and the following elected members: Pedro Albertos (Chair), Peter Fleming, Graham Goodwin, Stephen Kahne, Hidenori Kimura, and Manfred Thoma. It would turn out that this structure would be slightly altered based on requirements of Swiss law. In any case the near future of the IFAC Foundation was to lie in the hands of these 9 experienced IFAC leaders. They would deal with rules for obtaining funds and policies for using Foundation funds including endowment and annual funding decisions. To ensure that all donated funds to the Foundation would be used as expected by donors, IFAC would be charged for annual operating expenses of the Foundation. A small task force was set up to examine the IFAC Constitution and By- Laws to determine if changes were necessary to account for the new IFAC Foundation. Some more details may be found in Chapter V.

Since the IFAC 50th anniversary celebration was about one year away there was more detailed discussion of the planned program in Heidelberg and a status report was given on the various projects that were underway as part of the celebration. The annual financial report

was a bit more complex than usual because of these two major activities. Fortunately, IFAC's financial situation was strong and the two projects did not represent an unreasonable financial burden.

2005 - Prague - Congress

The participants of the 16th IFAC World Congress had the opportunity to take part in the wide spectrum of categories for technical presentations, including plenary lectures, survey papers, regular papers of both lecture and poster session types, and panel discussions. Immediately preceding the formal opening of the Congress, tutorials and workshops were offered giving participants an opportunity to learn new principles, methodologies, technologies and applications that have been developed in recent years. The Congress was a great success in terms of number of submitted contributions and participants. Below is a summary of congress statistics:

Papers submitted 3284

Papers accepted for the final program 2456

Countries contributing to the program 73

Overall attendance 2462

Attendance from academia 2099

Attendance from industry 363

Countries represented by the registration 63

Total number of authors of accepted papers 5162

Authors of accepted papers from academia 4805

Authors of accepted papers from industry 357

Number of countries contributing to the technical program 73

One of the key points of the IFAC World Congress Prague 2005 was to encourage people from industry to attend the Congress either as contributors or passive participants. The effort made by the International Program Committee and members of the IFAC Technical Board resulted in participation of 176 different companies from 30 countries all around the world in the Congress technical program. There were 279 authors from industry authoring or coauthoring papers scheduled for the final program.

Well-known experts in emerging/important areas of interest within IFAC were invited to share their expertise with Congress participants. Six plenary sessions were organized. The

first plenary speaker was Rudolph Kalman, Swiss Federal Institute of Technology, Zurich, on "The Evolution of System Theory: My Memories and Hopes". There was no chair left in the Congress Hall of the Prague Congress Center as everyone was eager to see and hear the living legend of System Theory. Kalman reviewed the evolution of system theory over the last 100 years, and especially since Ronald Foster's famous 1924 paper. His inevitable conclusion was that (after the basic physical issues have been cleared up) progress or failure in engineering research in system theory has been directly linked to progress or failure in solving the underlying purely mathematical problems, regardless of whether these problems were already the subject of study in another unrelated context or had to be formulated ab initio.

The second plenary speech was industry oriented. S. Chand, Vice-President and Chief Technical Officer of Rockwell Automation, Milwaukee, USA, presented a plenary paper entitled "From Electric Motors to Flexible Manufacturing: Control Technology Drives Industrial Automation". Industrial Automation has evolved from standalone, hard-wired relay panels to a contemporary, networked system of today that supports flexible manufacturing and enterprise integration. The presentation summarized the major technical trends, and highlighted the continuing opportunities and challenges for the application of control technologies. Trends such as the adoption of open networks like the Ethernet, migration of intelligence to sensors and actuators, and the evolution of semiconductor and sensing technologies, are driving greater distribution of control and decision making in the architecture. The diversity of future needs was illustrated by two applications described in detail: electric motor control and autonomous agent-based systems for fault-tolerant control. S. Chand introduced the program of the first Industry Day.

The program of the first Industry Day continued by an attractive plenary given by Rolf Isermann, Institute of Automatic Control, TU Darmstadt, on "Mechatronic Systems: Innovative Products with Embedded Control". Many technical processes and products in the area of mechanical and electrical engineering are showing an increasing integration of mechanics with digital electronics and information processing. Formerly mechanical functions are replaced by electronically controlled functions, resulting in simpler mechanical structures and increased functionality. Of major importance are the simultaneous design of mechanics and electronics, hardware and software and embedded control functions resulting in an integrated component or system. The contribution summarized ongoing developments for mechatronic systems, presented design approaches and examples of mechatronic products and considered especially the various embedded control functions and systems integrity. Isermann started with the historical development and gave definitions for mechatronic systems. Then the design methodology of mechatronic systems was considered, taking into account the design steps of simultaneous, integrated engineering.

Typical development models, known as V-models, were shown, including specification, off-line simulation, control prototyping, code generation, function and system testing with hardware-in-the-loop simulation, calibration/tuning of control functions, validation and verification and field testing. Examples of mechatronic systems, such as braking systems (ABS, ESP), the brake by-wire electro-hydraulic brake system (EHB), steering systems (active front steering), active suspension systems, common rail injection systems, variable valve control systems, variable geometry turbochargers and automatic gears, were shown. Realization of embedded control functions for mechatronic systems including reliability and safety functions was discussed. Experimental results were shown for automotive drive dynamic sensors and electrical AC motors. An overview described the development to intelligent mechatronic systems, fault-tolerant systems and drive-by-wire vehicles and discussed requirements for the education in mechatronics.

The program of the second Industry Day was introduced by a plenary presentation given by M. Bruns, Vice President A&D AS Process Automation, Siemens AG. The topic was “Some Trends in Industrial Automation”. Several fast growing technologies were discussed, namely: RFID, Industrial Wireless LAN, with the main goal to increase reliability to a level where “wireless is as safe as a wire”, isochronous RT Ethernet and ICs for this technology. It was explained that the objective of isochronous RT Ethernet is to use the same Ethernet infrastructure for office and also for time critical applications (e.g. machine & drive control). Current R&D focuses on refining network traffic control algorithms in order to ensure safe- and reliable data transmission. R&D activities in Augmented Reality, as the intelligent combination of normal human visual perception and of computer generated information, were presented. The plenary then dealt with applications such as plant design, complex service & maintenance and remote expert support.

A broadly attractive presentation addressing successful automatic space missions was given in the plenary entitled “The Mars exploration Rovers: Hitting the Road on Mars” by N. Cox, NASA Jet Propulsion Laboratory, Pasadena,USA. Since the beginning of time, people have been fascinated by Mars. The history of missions was covered. Development of Mars Exploration Rovers was explained and their successful landing on Mars in January 2004 was described. The presentation discussed how the Mars Rover mission fitted into the overall Mars Program and NASA. The full story of building the rovers including autonomous control ability on the surface was described. The process of developing and testing autonomous functions was documented. Since landing, NASA had seen those capabilities at work and they have been critical in the rover’s success at finding evidence of past water. There was remarkable and positive feedback from the audience regarding the topic and also the form of the presentation. Unlike the other plenary presentations, N. Cox did not focus on automatic control itself but presented aerospace as an application area where automatic control plays a leading

role. The presentation was a great success. A number of young people discussed the topic with Mrs. Cox days after the presentation.

In the “Issues on Robust Adaptive Feedback Control” by Michael Athans et al., MIT andUniversidade Técnica de Lisboa, recent progress in the field of robust adaptive control was summarized. A general philosophy for designing “robust” adaptive multivariable feedback control systems for plants that include both unmodeled dynamics and uncertain real parameters in the plant state description was discussed. More recent approaches to the adaptive problem involve multiple-model techniques where the parameter uncertainty set is subdivided into smaller subsets; each giving rise to a different plant model but with reduced parameter uncertainty. The identification of the most likely model was carried out by a “supervisor”, which that either switches in and out the controllers based primarily on deterministic concepts or relies upon stochastic designs (dynamic hypotheses-testing) that generate online posterior probabilities reflecting which of the models is more likely. The following questions regarding models employed were defined: (a) how to divide the initial large parameter uncertain set into N smaller subsets, (b) what should be the size of each subset and (c) how big should N be. The talk focused on “robust performance” requirements on the adaptive system implemented by one of the available multiple-model methods by exploiting recent advances on robust non-adaptive designs using the so-called mixed-mu-methodology-synthesis. A systematic method for selecting the smallest number of models while guaranteeing a priori bounds on desired performance was presented.

Semi-plenary sessions concluded the technical program on Monday and Wednesday. Manfred Morari, Swiss Federal Institute of Technology, Zurich, presented an attractive talk on “Hybrid Systems: Theory, Computation and Applications”. Historical examples and an introduction to the emerging area of hybrid systems (i.e. dynamical systems with switches) were provided. Examples from power electronics, systems with hard bounds and/or friction, driver assistance systems, anesthesia and active vibration control were described as systems belonging to the category. Theoretical developments were highlighted and the extensive software that helps to bring the theory to bear on the practical examples was mentioned. In conclusion, an outlook for hybrid systems and control was generalized.

The second semi-plenary lecture by Jozsef Bokor, Hungarian Academy of Science, Budapest, and Gary Balas, University of Minnesota, was on “Linear Parameter Varying Systems: A Geometric Theory and Applications”. Linear Parameter Varying (LPV) systems appear in many modeling and control problems related to aerospace or vehicle system applications. This talk proposed a geometric view of LPV systems. Elaborating the geometric concepts and tools of parameter varying invariant subspaces, the authors investigated invariant subspace algorithms for a class of LPV systems. Using the geometric results and associated invariant subspace algorithms, prototype control problems like disturbance-decoupling problem and

the like were discussed for affine LPV systems. The advantage gained by using LPV formalism was shown and solutions to some nonlinear problems, that could be hardly computable in the original nonlinear form, were demonstrated. Applications to aerospace control design and road vehicle control systems were shown using MATLAB.

The other two semi-plenary lectures were organized within the program of the second Industry Day. The first semi-plenary lecture of the Industry Day, entitled "A Distributed Automation Framework for Plant-Wide Control, Optimization, Scheduling and Planning", was prepared jointly by Vladimir Havlena, Honeywell Laboratory Prague, and Joseph Lu, Honeywell Process Solutions, Phoenix. The objective of the talk was to identify current open problems and trends in plant wide control and demonstrate a solution based on distributed, solution- component- based architecture for integrated process management, embracing the layers of Advanced Process Control, Real Time Optimization and Planning & Scheduling, in selected application areas. The problems and outlined solutions were intended to stimulate discussion as well as attract more research interest.

A more specific issue was presented in the last semiplenary "Systems Engineering for Irrigation Systems: Successes and Challenges" by Iven Mareels et al. In Australia gravity fed irrigation systems are critical infrastructures essential to agricultural production and export. By supplementing these large scale civil engineering systems with an appropriate information infrastructure, sensors, actuators and a communication network it is feasible to use systems engineering ideas to improve the exploitation of the irrigation system. The presentation reported how classical ideas from system identification and control can be used to automate irrigation systems to deliver a near on demand water supply with vastly improved overall distribution efficiency.

2006 - Heidelberg - Council meeting

This was the anniversary year as explained previously. Descriptions of the celebratory event and related projects may be found in the Anniversaries chapter. The Council and related meetings were held in Heidelberg where IFAC started 50 years earlier; in fact some of the activities in 2006 occurred in the same buildings that had housed the first meeting of what was to become IFAC!

The anniversary year seemed to be a factor in an exciting event in IFAC's history. For the first time, seven NMOs came to the Council meeting prepared to offer to host a future IFAC Congress (2014). One of the bid teams was actually a partnership between Nordic Countries NMOs. There was no obvious provision in the IFAC Constitution for such an arrangement so if they had emerged as a finalist it would have required some serious examination of IFAC's legal documents, but that was not to occur. Several of the previous IFAC Presidents had been encouraging more activity on the part of its NMOs and the large number of candidates might

have signaled some success in this effort. In any case this marked a qualitative change in expressed interest in Congress hosting and was to carry on in the coming years.

As usual there were a few NMOs that were potentially to be terminated for lack of annual fees payments and one new NMO welcomed into IFAC. Membership stood at 48 as a result of those actions.

IFAC's publications program was entering an important transition. As we have seen the justification for printing symposia proceedings was no longer financially sustainable. One reason was that although there might be a few papers from a particular conference that could be of interest to an individual researcher, it was unlikely that the entire package of papers would have much of a market for anyone except libraries. Library budgets were being reduced as online resources became available so the printed proceedings market was drying up as is described in Chapter IV. Although the IFAC journals were doing well, there was some weakness with the affiliated journal efforts. The primary problem to be faced was how to get papers presented at IFAC technical meeting into the hands of interested readers. Previously conference papers were included in a proceedings volume and these volumes could be purchased from the IFAC Publisher, Elsevier. Attendees at the event would receive a preprint volume that could not be sold after the conference. It was obvious that the structure of IFAC Publications had to be adjusted. A Task Force consisting of the IFAC Publications Managing Board was requested to study this matter. Concerns were expressed that the IFAC Publisher was not adequately dealing with these transition issues.

A minor tax issue had arisen based on income from publications. The Treasurer worked with Swiss tax authorities to resolve the matter with the payment of some back taxes. IFAC's 2006 expenses were somewhat higher than usual due to startup costs for the IFAC Foundation, the 25th anniversary and for payment of the back taxes. In following years all expenditures returned to normal. Formal changes in the IFAC Constitution were determined to be unnecessary to handle matters related to the IFAC Foundation. There would have to be changes in the Operating Guidelines that would be written in the coming year.

With the second iteration of Fellows selection underway, some procedural realignment was needed. The selection process, going forward would be managed by the IFAC Awards Committee who would prepare voting materials for the Council. No Constitution change was needed in this case either. Because of the "shrinking" time schedule for Congress venue and Presidential nomination, some criteria adjustments were necessary for IFAC's Outstanding Service Award. Certain service duration criteria in some leadership positions had to be changed from the original criteria. Current incumbency in the certain positions excluded eligibility for OSA nomination. These included Council members, TB and EB members, Secretary, Treasurer, TC Chairs, Editors-in-Chief and Editors of IFAC journals. In order to improve IFAC's visibility a new part-time employee was hired to create and maintain the IFAC

website. Although rather crude, the website was already observed to be essential both for public exposure and for IFAC management and leadership.

2007 - Toulouse - Council meeting

It was at this Council meeting in Toulouse that the new approach to conference paper distribution was discussed in detail. There had been an evolution of thinking that conference paper distribution was best done by centralized distribution of proceedings volumes to a new model where individual papers were accessible electronically. After a preliminary endorsement at the Heidelberg meeting the previous year, the concept behind IFAC-PapersOnLine (POL) had been thoroughly worked out and the Council gave its formal approval to proceed. Details may be found in Chapter IV. As the PUMB contract between IFAC and Elsevier would be up for renewal in 2008, that document would reflect the new POL inauguration. Some concerns had arisen about reviewer ethics and the requirement for confidentiality by reviewers. Various issues of ethics and finances were clarified and reported to Council for discussion and approval. The IFAC Policy Committee played a role in some of these discussions.

A long-standing problem in the awards program had been issues of nomination and selection of award winners and appropriate venues for presentation of various awards. Some of these matters needed to be clarified in time to affect the presentation of awards at the Seoul Congress in 2008. These would affect awards nomination and selection procedures going forward. This eventually led to separate committees to nominate candidates and then to select the winners.

Expenses for 2006 were somewhat above normal and this led to a small deficit that year and also in 2007. Performance It was expected to return to a surplus in 2008. IFAC would then be back on track for a small annual surplus with about 50% of annual income coming from the publications program. Publications net income to IFAC remained substantially above the contractual minimum and there was expected to be an increase in publications income rates in the new contract as well.

Under the leadership of Vice President and TB Chair Sirkka-Lissa Jamsa-Jounela the Technical Board operations had undergone an impressive change taking advantage of new web based technologies. This improved the reporting of the TB's numerous technical events, now numbering about 30 per year between Congress years, and provided each of the TCs and CCs with a new electronic home from which their business could be conducted. As IFAC's website improved, even more progress was in store for these vital technical organizations. Master Plan events were drawing an average of 130 attendees while the other technical meetings attracted about half as many. This was in line with expectations as noted in Chapter III.

The final pieces of the on line access to IFAC conference papers is now in place. PapersOn-Line (POL) provides a single location where readers may find all papers from all IFAC technical meetings in an open access format, citable, and searchable with ISSN, ISBN, and DOI numbers. Juan A. de la Puente of Spain is the Editor in Chief of this new archive. This initiative requires even more careful peer review of all papers published on the POL site and so helps the conference IPCs maintain high technical standards for all submitted papers. The POL website is maintained by IFAC and will contain all papers from all IFAC meetings going forward. For the time being, both IFAC and Elsevier will subsidize all this. Integration with the IFAC journals is also anticipated in the future. It was noted that with all the emphasis on citations and indexing being done by third parties more attention was needed to a Code of Ethics for editors and reviewers. This, of course, was not limited to IFAC. The entire scientific publishing community is focused on such matters. Another innovation to help dissemination of technical results of meetings is video recording of plenary lectures to be mounted on IFAC's developing web presence.

The IFAC Publications Managing Board has played a fundamental role in the success of IFAC Publications since 1976. Manfred Thoma, IFAC President from 1984 to 1987, was an important part of the publications evolution in IFAC and it was at this Congress that he retired from active involvement with IFAC.

As will be recalled one of the important activities of each General Assembly meeting that takes place at each Congress is the election of officers and other Council members for the coming triennium. Since the beginnings of IFAC's history there had been normal progression for the person who is elected as President that he had previously served as an IFAC Vice-President. Since the new constitution was adopted in 1984 the President had thus served as Vice-President and Chair of either the TB or the EB for at least one term. In 2008 the nominated and then elected President Professor Alberto Isidori did not previously serve as an IFAC VP. Isidori is a distinguished control theorist from Rome as will be seen in his biography and commenced his presidency with great appreciation by the General Assembly.

The very generous donation by Wook Kwon has put the IFAC Foundation in a good position to begin its programs of support. Other donations from NMOs are pledged as well. The Cuenod Trust Fund remains a small source of available funds. Some formal changes in the governance structure of the Foundation were required by Swiss law as the legal papers were signed in Zurich. Two categories of support were announced:

1. Support for young authors at IFAC Congresses and

2. Creation of regional post-graduate short courses in developing countries are being planned.

The Seoul Congress has benefitted from use of “Paper Plaza”, a third-party conference registration and program support package managed by Pradeep Misra, a long-time volunteer from the US and former IFAC committee member. As the Congresses get larger each year, access to such software is an important tool to simplify meeting organization.

Another example of software support now implemented is TC support within the TB. It provides tailored mailing lists by subject to help create mailing lists for various IFAC technical meetings and supports standard web presence for each of the TCs. As we have seen previously, a training session for TB and TC leaders was introduced at earlier Congresses. A refinement in TC structure was to distinguish between “active” and “corresponding” membership in some of the TCs. This tends to clarify expectations of TC membership while not restricting involvement of those interested in a particular technical field. There was more emphasis placed on involving women in TC leadership roles. There was also some change in expectations for triennial milestone reports form the CCs. The quality of these reports varied from CC to CC, so it was thought that maybe it should not be expected that each CC prepare a milestone report every three years. The new plan was to encourage those CCs with interesting developments to report when it was possible, and not expect every CC to report at every Congress.

With the complexity of the EB operations growing the type of in-service training used by the TB was discussed for the EB as well. However, because of the breadth of scope of the several EB committees this may be more difficult than originally contemplated. After some discussion it was concluded that Operating Guidelines would be a more appropriate approach to training in the case of the EB.

2008 - Seoul - Congress

Professor Wook Hyun Kwon of Seoul National University served as IFAC President from 2005 to 2008 and hosted the 17th IFAC World Congress in Seoul from July 6 to July 11, 2008. Professors Hyungsuck Cho was General Chair, Dongil Cho, Program Chair, and Shinji Hara of Japan was Program Co-Chair for the Congress.

The organizers of the Seoul Congress invited many researchers from overseas particularly to show the modern face of Korea since the country is located far from many Congress attendees. In order to achieve this, the registration fee was lowered to 550 USD including the banquet; special care was taken to create interesting technical, social, and cultural programs related to Korea. The organizers found substantial financial support from Korean industry that helped defray the cost to run the Congress.

The congress was at the COEX Convention Center, which is located within the World Trade Center Seoul Complex in the central business area of Seoul. This facility allowed 31 parallel sessions on the same floor. Registration desks, poster sessions, exhibitions, Internet and

computer facility, and snack bars, were all located at a large exhibition hall so that it became a meeting place for all participants. Enough wireless channels were provided so that participants could access the Internet easily without any interruption throughout the congress venue.

The congress organized “highlight” technical sessions on current developments and practices in control and automation areas where Korean industries had shown world- class competitiveness. They are Automation in semiconductor, display, and electronics industry; Automation in ship building; Automation in steel industry; Life care intelligent robots; and Control technology in automotive industry, where many Korean industry researchers were invited to talk. The latest robots developed by leading Korean research institutes such as KAIST, KITECH, ETRI, KIST, and Korea University were invited and demonstrated at the exhibition hall during the Congress.

Congress organizers tried to provide participants opportunity to see technical activities of various leading Korean companies through technical tours. Technical tours included visits to Samsung Electronics, LG Electronics, Hynix Semiconductor, Hyundai Motor Company, Hyundai Heavy Industry, POSCO, KT, and a successful start-up company, Hyumax. The congress had a policy not to cancel any tours if at least one person wants to attend.

There were 18 pre-congress tutorials and workshops. None were canceled, even if there was only one attendee, and if the instructors agreed.

There were several special events during the congress. The congress attendees were impressed with the banquet, which was held on July 10. Approximately 2,200 people joined the banquet with about 220 round tables with dinner served in a single room.

The congress provided a VIP dinner on the first day of the congress at a restaurant reached by a Han River cruise. About 400 VIPs who were recommended from each NMO and at least one from each non-NMO country were invited and they felt a sense of being part of the IFAC family. The Congress also provided free lunch gatherings where pre-registered participants learned about Korean culture such as mastering the Korea language in one hour, learning the traditional Korean paper craft, and learning about Korean experiences for the fast economic development in the post-war period. An interesting social tour to a mountain in North Korea was popular.

Twenty-five graduate students from developing countries and who actually presented their papers, were financially supported through the IFAC Foundation, created in 2006. This type of support was to continue in subsequent congresses. Many Asian graduates from Asia were supported by the congress organizers.

There were 9 plenary lectures given at the Congress. These plenary talks were presented by the world's most eminent scholars chosen among 69 nominees recommended by an ad hoc Plenary Board and CC/TC Chairs of IFAC. The plenary papers addressed new concepts/approaches, development methodologies/tools, and current status/future direction in theory, technology and applications of automatic control.

The first plenary speaker was R. Brockett, Harvard University, USA, on "Reduced Complex Nonlinear Control Systems". The presentation discussed methods for the analysis and design of systems controlled. He focused on the role that feedback can play in simplifying the characterization of trajectories and, in particular, the extent to which elementary feedback rules based on finite state automata can be used to reduce the complexity of both the controller and the analysis. He introduced a new control paradigm based on randomized finite state controllers and present analysis of a class of such systems.

The second plenary lecture was presented by Captain E. Tarnowski, an experimental test pilot at Airbus, on "Overview of Potential Evolutions of Technologies Applied in Commercial Transport Airplanes". Automated systems assisting pilots in the achievement of their essential operating tasks have been one answer provided by airframe manufacturers to the problems raised by the present democratization of commercial air transport. The predicted evolutions of global air traffic in the next two decades are extremely promising and challenging. Indeed, they raise very severe issues in terms of airspaces saturation, air safety and efficiency, and environmental consequences. The next generation airplanes must and will represent a new technological step forward in the transport aviation industry in order to meet extremely demanding challenges.

In the plenary speech "Robust Control in Biology: From Genes to Cells to Systems" by Frank J. Doyle III, UC Santa Barbara, USA challenges in the field of systems biology are outlined from the perspective of control and dynamical systems. These exquisite biophysical networks have enviable properties with regard to robustness to disturbances and uncertainty, as well as noise tolerance. Several examples used to motivate the ideas, including neurons controlling circadian rhythms, programmed cell death (apoptosis), and signaling pathways for glucose metabolism were introduced.

X.-R. Cao of Hong Kong University of Science and Technology, presented "Stochastic Learning and Optimization - A Sensitivity-Based Approach". He introduced a sensitivity-based view of the area of learning and optimization of stochastic dynamic systems. He showed that this sensitivity-based view provides a unified framework for many different disciplines in this area, including perturbation analysis, Markov decision processes, reinforcement learning, identification and adaptive control. Many results can be simply derived and intuitively explained by using two performance sensitivity formulas. In addition, he showed that this sensitivity-based view opens up new directions for future research. For example, event-based

optimization, which has advantages over the state-based approaches, may be developed with this sensitivity-based view.

The presentation by L. Ljung, Linkoping Universitet, Sweden, described “Perspectives on System Identification”. System identification is the art and science of building mathematical models of dynamic systems from observed input-output data. It can be seen as the interface between the real world of applications and the mathematical world of control theory and model abstractions. As such, it is a ubiquitous necessity for successful applications. System identification is a very large topic, with different techniques that depend on the character of the models to be estimated: linear, nonlinear, hybrid, nonparametric, etc. At the same time, the area can be characterized by a small number of leading principles, e.g. to look for sustainable descriptions by proper decisions in the triangle of model complexity, information contents in the data, and effective validation. The area has many facets, and there are many approaches and methods.

The recent issues and efforts in automation and control systems technology in the Korean shipbuilding industry were described in the plenary presentation, “Automation and Control Systems Technology in Korean Shipbuilding Industry: The State of the Art and Future Perspectives” by K.-S. Min, Vice Chairman and CEO/CTO of Hyundai Heavy Industries, Ulsan, Korea. The shipbuilding industry in Korea was in historic boom days owing to its timely investment and favorable business environment. To fortify the leading position in the global market, Korean ship construction companies have made hard efforts to improve productivity and quality through technological research and development. Thus, the shipbuilding industry in Korea has been gradually transformed to a technology driven industry from a labor intensive one. He predicted that, in the near future, many innovative changes in shipbuilding are expected to come through convergence of technologies, and that the automation technology will play a key role during this process.

Hidenori Kimura of the Institute of Physical and Chemical Research, Nagoya, Japan, introduced and discussed “A Control-Theoretical Approach to Model-Based Medicine”. The presentation discussed the notion of model-based medicine which is expected to give a solution to various difficulties in clinical medical systems based upon the familiar methodology of control science. The model-based medicine relies essentially on an integrated model of the visceral system of human body that includes various functional subsystems such as respiration, circulation, thermal, digestion, urinary, endocrine/neuronal systems as its component. He introduced an example of such integrated models of the human body developed in the laboratory. Novel results, which enhance the effect of therapy, were presented concerning brain hypothermia treatments based on the model. Also, he proposed a new hypothesis on the cause of diabetes based on the integrated model, as well as clinical evidence. The real cause of elevation of blood glucose is the homeostasis of glucose concentrations in the brain.

In other words, the elevation of blood sugar itself is not as harmful as people think, because it is an outcome of control of the brain sugar. Long-term effect of psychological stress was shown to cause diabetes based on the model.

The presentation, “BigDog, The Rough-Terrain Quadruped Robot”, by Marc Raibert et al., Boston Dynamics, Waltham, US, showed how the BigDog runs in rough terrain. Less than half the Earth‘s landmass is accessible to existing wheeled and tracked vehicles. But people and animals using their legs can go almost anywhere. The mission at Boston Dynamics is to develop a new breed of rough-terrain robots that capture the mobility, autonomy and speed of living creatures. Such robots will travel in outdoor terrain that is too steep, rutted, rocky, wet, muddy, and snowy for conventional vehicles. They will travel in cities and in our homes, doing chores and providing care, where steps, stairways and household clutter limit the utility of wheeled vehicles. Robots meeting these goals will have terrain sensors, sophisticated computing and power systems, advanced actuators and dynamic controls. He gave a status report on BigDog as an example of such rough-terrain robots.

“SmartFactory - from Vision to Reality in Factory Technology” was presented by D. Zuehlke, University of Kaiserslautern, Germany. New technologies and products offer a broad range of new applications not only in the consumer but also the industrial world. A simple adaptation of existing technologies from the area of consumer goods appears tempting but, this would be inappropriate for industrial use in most cases. The SmartFactoryKL initiative was founded by many industrial and academic partners to create and operate a demonstration and research test bed for future factory technologies. Many projects develop, test, and evaluate new solutions. He showed the path that has been taken in Germany with the Smart FactoryKL initiative, to examine, test and develop technologies. He recommended it for use at other places. He asserted that the resources required are not to be underestimated and that success can only be realized through strong, interdisciplinary cooperation among industry, academia and government. The Congress was a great success in terms of number of submitted contributions and participants as summarized in the below:

Papers submitted 3712

Papers accepted for the final program 2716

Countries contributing to the program 72

Overall attendance 2741

Attendance from academia 2233

Attendance from industry 508

Countries of Corresponding Authors 65

The following table shows the 10 countries with the largest numbers of authors contributing to the Congress technical program:

France	588
China	569
Korea	552
Japan	447
USA	392
Germany	334
Italy	249
Spain	243
United Kingdom	207
Taiwan	146

Two important changes were introduced in the 2008 Congress:

1. First, a new IPC structure was introduced: That is, each of the 9 Coordinating Committee Chairs were made Congress Technical Editors, and 39 Technical Committee Chairs as well as 20 other renowned researchers were made Congress Technical Associate Editors. These editors were responsible for attracting a large number of submissions as well as conducting peer-scholarly reviews of those submitted papers. This change was quite effective and is planned to be implemented in all ensuing Congresses;
2. The second change was the use of PaperPlaza, which is a paid professional service for handling all submissions and managing a huge reviewer database. The 2008 Congress was the starting point for using PaperPlaza for IFAC. Since then, PaperPlaza is used in most IFAC conferences, which has proven very useful for reaching a large number of potential authors and reviewers.

Another contribution of the Seoul Congress organizers is the production of a “Book of Banners” that includes high quality images of each of the IFAC Congress banners that have been produced for each Congress in the past. Included with this booklet is a brief history of these banners as an IFAC tradition. The banner for the coming Congresses is generally displayed for the first time at the closing ceremony of the preceding Congress.

As an epilogue, it is worthy to note that the 17th IFAC WC received the 2009 Best Conference Award among all conferences held in Seoul during 2007 and 2008 from the City of Seoul. That is a feat.

The London meetings of the Council and related Boards and Committees followed the very successful Congress in Seoul the previous year and once again attracted seven NMOs ready to host an IFAC Congress, this time in 2017. After the first round of bidding, finalists for the following years presentation included NMOs from France, Japan, and the Netherlands.

By this time the Secretariat electronic support functions were fully operational and the IFAC website was now an essential part of the federation. All TCs had websites available to them. Some used this resource more than others. A steady state level of technical activities had been achieved with about 60 technical events per triennium, almost all of which relied on the Secretariat support functions noted earlier. Conference approvals were being handled within a very few weeks, editorial functions fully supported through PaperPlaza, mailings lists readily available, and meeting statistics readily acquired. POL was being populated with papers from current conferences and at the request of the TB papers from preceding meetings were being entered as well. This started with previous Congress papers but the TB was encouraging scanning of all previous conference papers as well.

Since there were approximately 900 previous technical meetings of IFAC the latter request represented a major investment. The matter was postponed for further analysis and it would be several years before the commitment to capture all this material in POL was made and funded. There were still some difficulties getting POL papers indexed on all the major indexing services and this difficulty would be one of the drivers for making a major change in the POL operation in the near future. For many authors what might appear to be minor details in citations and indexing were potentially major barriers to attracting papers for IFAC meetings. This was a top agenda item for PubCom and PUMB as well as the TB in general.

A Code of Conduct for Reviewers and Code of Ethics for authors were presented and adopted in principle with minor changes to be made going forward. Operating Guidelines for the various EB committees had been prepared in the previous year and were almost in final form. One might attribute these systemic improvements in IFAC support to the growing popularity of Congress bidding noted above. Information was more readily shared between succeeding Congresses. On the other hand, IFAC Congresses were growing in size and this put more limitations on the number of available venues in some countries. It was not viewed as a particular problem since there was not a shortage of interested in NMOs for future Congresses.

IFAC financial reserves were healthy (greater than three times the annual expenses) if not growing much. The new activities described above did add to the expenses but were felt to be of such value to the NMOs that having an occasional small deficit in the annual operating budget was not viewed with concern. The world economy, POL startup costs, hiring a web master as a budgeted employee all were occurring at the same time but with measurable im-

provements in productivity and benefits to the IFAC community. Quality of services and technical output remained the major goal of the IFAC leadership team.

2010 - Baltimore - Council meeting

Baltimore in the US was the venue for the Council and related meetings. Since it was just prior to the Congress, it was the time to select the next Congress venue and Presidential candidate. France was selected, and the 2017 Congress would be held in Toulouse with the future President Janan Zaytoon.

The Technical Board was doing some minor adjustments with its TCs, ironing out scopes and making small adjustments in the placement of the TCs within the CCs. An important question for the TB was how to place the education component of IFAC within the TB. We shall see that eventually there would be a "coordinating" function for education across all TCs.

Two important changes were made to the IFAC Fellows program now having been through two triennia of experimentation. A Fellows Nominating Committee was created to provide a wider view of potential candidates. It was also decided that in the future the Fellows cycle would be triennial rather than annual. The plan was to keep about the same number of Fellows elected per year (maybe 5 to 10) as in the past but to do the evaluations and elections triennially with presentations at the Congress if possible. The entire Fellow election process would be quite transparent by using the IFAC website and Newsletter for announcements and Fellows listings while maintaining a complete list of Fellows on the IFAC website.

It turned out that the current triennium saw a very high percentage turnover of TC Chairs between the previous and present periods. This created a bit more turmoil than usual and the Council was urged to be conscious of this in the future election cycles. It was preferred to create a better balance between newcomers and veterans to enhance continuity and strategic thinking of the CCs and TB itself.

Another concern that came up was the effective enforcement of Codes of Conduct and Ethics in peer reviewing for both IFAC conferences and journals. Even the "impact factor cooking" problem was brought up. Some (non-IFAC) journals were known to affect reviewing procedures in a manner that reference and citation measurements would positively affect the Impact Factor of the journal rather than the quality of the paper. This was absolutely forbidden within the IFAC community. New software technologies were appearing that could help locate possible plagiarism but to actually determine if there were ethical violations required careful analysis and mature discretion. As noted earlier a number of problems remained in the POL work due to careless formatting and inadequate indexing by authors and Symposium editors. This required attention in order to maximize the effectiveness of more automated support of the paper reviewing and electronic publication processes.

When there were many Technical Committees, the number of Working Groups (WGs) grew but often were not very effective. That was one of the motivations of the TB restructuring starting in the 1990s. WGs could be problematic for several reasons. WG leadership was not well recognized within the IFAC hierarchy and could tend to diffuse the work of a TC. Occasionally a well-functioning WG could be split off to create a new TC but this occurred infrequently. The emphasis in the TB was a strong collection of TCs coordinated by the CCs.

With the maturation of IFAC-PapersOnLine (POL) the long term stability of this publications program was essential so its sustainability was of some concern to IFAC. POL was built on a privately owned platform that had been designed and was maintained by a small vendor. The functional system design was ideal for IFAC and it was understood to be important that this design should be continued with a long-term commitment to its growth. More about the eventual transition to the IFAC Publisher as an integral part of the IFAC Publications program with Elsevier, can be found in the Publications chapter.

Following the recent IFAC 50th anniversary, more thought was being given to a long-term focus on the history of IFAC as an entity. Future Councils would deal this going forward.

2011 - Milan - Council meeting

The Congress was held in Milan, a city closely associated with one of the early control engineers - Leonardo DiVinci. In addition to careful program design including some 2500 papers, an historical theme was evident in the IFAC Congress week. Having recently celebrated a major anniversary, IFAC also began to reflect on its own history. There was to be a strategic planning effort orchestrated by the incoming President Ian Craig of South Africa. This would be the first such effort in almost 20 years and would start with an environmental scan, followed by actions to redesign certain areas of the IFAC structure and stabilize and strengthen others. IFAC was now a large efficient organization that needed to take a more outward look ensuring that its public image was welcoming and attractive to the younger generation in the control community. That would be the theme of the coming triennium.

Change was coming to IFAC: The longtime Secretariat staff was retiring, and the IFAC Treasurer was coming to the end of his 12-year term, Publications procedures needed to be standardized, and Conference approval and organizational requirements needed to be streamlined. Website improvements would require a dedicated staff member in Laxenburg. A conference management system would be adopted that included conference registration and publications support. Some previously acceptable practices needed to be changed to ensure that data could be collected and IFAC's core technology of "feedback" applied to the management of IFAC itself.

IFAC's continued financial strength could be leveraged to undertake several projects to enhance the longterm impact of IFAC in the community. It was appreciated that to attract the

new generation of control engineers and scientists, social media would need to become part of IFAC's portfolio including capturing plenary lectures and other technical materials, ensuring that full indexing was applied to all technical papers from IFAC technical meetings, and improving accessibility of all IFAC papers to the technical community. IFAC needed be looking ahead rather than catching up in emerging technical areas. All of this would be captured by focused planning in four areas as recommended by incoming President Craig:

1. Excellence
2. Relevance
3. Sustainability
4. Diversity

Decisions at the Milan Council meetings enhanced the process to create the underpinnings of this forward-looking program. POL was now fully functional but built on a somewhat unsteady platform so initial discussions were underway to shift its foundation to the IFAC Publisher, Elsevier and its Science Direct system. This transition would be reflected in the next PUMB contract to be signed in 2014 in Cape Town but in the meantime the details needed to be worked out. It is somewhat ironic that over the life of the IFAC/Pergamon Press/Elsevier relationship as described in Chapter IV of this history, we can see a transition in the publisher's thinking, that started with a complete lack of interest in conference papers, to their full acceptance of the importance of making IFAC papers individually available online in an open source environment. With the steady urging of IFAC leadership, by the time of the Milan Congress in 2011 they were convinced it was a worthwhile goal, and would work with the IFAC Publications Committee and IFAC Publications Managing Board to contractually agree, at the expiration of the current contract, to be a full partner in this initiative. This was another motivation to standardize paper submissions, reviewing, presentation and publication.

2011 - Milan - Congress

The Milan Congress brought together control engineers from 73 countries. The Italian NMO was proud to note that Milan is the host at the Biblioteca Ambrosiana (Ambrosiana Library), the most complete and prestigious collection of Leonardo da Vinci drawings, the Atlantic Codex. At the Opening Ceremony, held 28 August at the MiCo Congress Centre, around 1,600 people took part. Welcome addresses were provided by:

Sergio Bittanti - Congress Chairperson, Alberto Isidori - IFAC President 2008-2011, Riccardo Pietrabissa - President of ICT Department of the National Research Council of Italy CNR, Councillor Cristina Tajani - Labour Policy, Economic Development, University and Research Department of the City of Milan, attending for the mayor, Giampio Bracchi - President of the Politecnico di Milano Foundation, attending on behalf of Politecnico di Milano.

On the evening of Saturday 27, the President's Dinner was held at the Milan Museum of Science and Technology. This is the same location where one of the earliest international conferences on automatic control, the Convegno Internazionale sui Problemi dell'Automatismo, was organized in 1956. Interestingly enough, that conference, held under the aegis of the National Research Council of Italy (CNR) with more than 1000 delegates, took place in April, prior to the automatic control congress of Heidelberg (where the IFAC resolution was signed in September 1956). During the dinner, the IFAC Outstanding Service Awards were presented.

The technical sessions were held at the Università Cattolica del Sacro Cuore (UCSC) of Milan. The opening ceremony (Sunday, 28 August) and the banquet (Thursday, 1 September) were held at the new MiCo congress centre in Milan.

The total number of submitted papers was 3,629, with 7,140 authors from 73 countries. Of these, 2,478 (2,030 oral, 448 interactive) papers were accepted which were authored by 5,412 people from 73 countries. The Congress DVD includes 2,473 papers since 5 papers were withdrawn at the last minute due to unexpected hold-ups by their authors. Therefore the acceptance rate was about 68%. These papers were presented in 341 oral sessions, and 9 interactive sessions. Of these, very few were no-show papers: 62 oral; 31 poster. Therefore, the no show rate was about 3.7 %.

Distribution of authors of accepted papers per country (altogether 73 countries), listing only those with more than 100 papers at the Congress, are shown in this list.

France - 653

USA - 412

Italy - 401

China, P.R. 331

Germany - 311

Japan - 290

United Kingdom - 204

Spain - 190

Australia - 151

Sweden - 146

Russia - 144

Brazil - 142

Canada - 136

Netherlands - 119

The plenary lectures were given in the Aula Magna of UCSC, in the morning 8:30-9:30 or in the evening 18:15-19.15. The lectures were replicated via video link to other main rooms (Franceschini and Gemelli). A variety of high-interest topics were covered, particularly emerging applications and strong impact methods:

Peter Terwiesch, ABB Ltd, Zurich Switzerland

"Closing the loop: an industrialist's perspective on the present and future impact of control"

Anders Lindquist. Shanghai Jiao Tong University (SJTU), P.R. China and Royal

Institute of Technology, Stockholm Sweden

"*On moment problems in robust control, spectral estimation, image processing and system identification*"

Paul K. Houpt, GE Global Research, Niskayuna, NY, USA

"*Smart grid and renewables integration: controls challenges and opportunities*"

Carsten W. Scherer, University of Stuttgart, Germany

"*Dissipation-based controller synthesis: successes and challenges*"

Koei Saga, Toyota Motor Corporation, Japan

"*Energy management of Toyota Hybrid System*"

The following parallel plenary lectures were given in the Aula Magna and in the Franceschini Room (video-linked to the Gemelli and Vito rooms):

Laurent Praly, MINES ParisTech, Fontainebleau, France

"On observers, a meeting of many view points and applications"

Brett Ninness, The University of Newcastle Australia

"Computational System Identification"

Alexander Kurzhanski, Lomonosov Moscow State University, Russia

"Closed-loop control under realistic information"

David B. Doman, United States Air Force Research Laboratory, Wright Patterson AFB OH, USA

"Towards insect-like maneuverability of flapping-wing micro air vehicles"

There was a special plenary panel session, entitled "Plugging into the origins of IFAC: The IFAC World Congress of 1960", to evoke the early days of IFAC by the accounts of the following team of scholars: Stephen Kahne, Rudolf E. Kalman, Manfred Thoma, Tibor Vamos, and John Westcott. The session, with Alexander Kurzhanski as Chairperson, took place in the Aula Magna on the afternoon of the last congress day. Since it was impossible for J. Westcott to take part in the congress, a prerecorded video interview with him (recorded at the Imperial College) was presented in his absence.

The technical program also included three panel sessions:

The Impact of Control Technology: Overview, Success Stories, and Research Challenges

Organizers: Anuradha Annaswamy (MIT) and Tariq Samad (Honeywell)

Energy and Environmental Challenges in Emerging Regions: Opportunities for Control and Monitoring Technologies

Organizers: Francoise Lamnabhi-Lagarrigue (CNRS and European Embedded Control Institute, France) and H.S. Jamadagni (Indian Institute of Science, Bangalore)

Preparing Tomorrow's Scientists and Engineers for the Challenges of the 21st century

Organizer: Bozenna Pasik-Duncan (University of Kansas)

The Closing Ceremony was held in the Aula Magna - UCSC, 2 September 2011. The ceremony began with a number of awards presented by George Irwin, chair of the IFAC Awards Committee. The following awards were made: Harold Chestnut Textbook Prize, Young Author Prize (YAP), Application Paper Prize (APP). Then, in the presence of a representative of Elsevier Co., IFAC Publisher represented by Christopher Greenwell, the awards for the best papers published in the IFAC Journals were presented. Lastly, as chairperson of the selection committee, Robert R. Bitmead delivered the award for the best paper presented in poster form (Interactive Paper Prize - IPP).

2012 - Gifu - Council meeting

Following a long tradition it was reported that the Italian NMO was contributing 55K Euro to IFAC from the surplus from the Milan Congress in 2011. In this way, fees from attendees at an IFAC Congress contribute to funds used by the IFAC Foundation. These help support attendees from developing countries to future Congresses and to other educational activities in

developing countries. There is an expectation that such contributions will continue in the future. None of the funds provided by such donations are for IFAC Foundation administrative expenses. Such administrative expenses are paid by IFAC.

Progress on the IFAC strategic plan had led to statements of vision and mission that were adopted by the Council as follows:

- The vision statement is "For IFAC to be the worldwide federation for promoting automatic control for the benefit of humankind"
- The mission statement is "To promote the science and technology of automatic control through technical meetings, publications and other means consistent with the goals and values of IFAC"

To continue the strategic planning process three task forces were created with reporting deadlines during the coming year:

1. The TF on POL Indexation is to ensure that all IFAC conference papers were properly indexed in the technical literature;
2. The TF on Human Dimensions and Societal Impact is to consider how IFAC as a society of scientists and engineers would ensure that it was relevant to societal needs and promoted itself to the external community;
3. The TF on Promotion Strategy of IFAC is to examine in detail appropriate use of online/social media resources to make IFAC attractive and relevant to young people and women both in the control field and in the educated public in general. Younger members of the IFAC community played a major role in this TF to demonstrate innovative uses for social media to promote IFAC to a younger audience as well as capturing some of the ongoing events of IFAC. It was also emphasized that the election committee during this triennium should be sensitive to including women in IFAC official candidate lists.

There is a growing percentage (up 12% between 2010 and 2012) of specialists coming from industry who are participating in IFAC conferences. That suggested progress is one of the long-standing goals of IFAC. It also reminded the Council that IFAC still has a decided academic bias and that opportunities for increased ROI (return on investment) for industrial participants continued to be a planning goal going forward.

Finally a standard mechanism for conference organization was established as a requirement for all IFAC technical meetings. It is based on a pair of software products, PaperCept and PaperPlaza, provided by a third party vendor. It was now required, in order to obtain IFAC sponsorship approval, that this software must be used and a commitment to do so was a prerequisite to obtaining that approval. This final target was reached after more than 50 years of

evolution and was the culmination of many thousands of volunteer hours of experimentation, trial and error, technology development and analysis. Now IFAC conferences are characterized by modern organization and open access of conference results.

Discussion had been underway to ensure that all printed proceedings of IFAC meetings would be available in perpetuity with appropriate backup and security. Stephen Kahne, an IFAC Past President had a large archive of past proceedings volumes that he was prepared to donate to IFAC. The Secretariat also had a similar set of proceedings. After detailed communication and planning including the IFAC Secretariat and Sergio Bittanti, Professor Kahne's entire collection of proceedings volumes were donated to the Instituto Lombardo library in Milano. With two complete sets available in two separate locations, it was felt that the permanence and security of this irreplaceable archive was assured. Going forward all archiving would be based on electronic copies of conference papers so an electronic data base "IFAC-PapersOnLine (POL)" would obviate the need for hard copy archives in the future.

After careful planning, 2012 was the year that after more than 20 years Barbara Aumann and Ernestine Rudas, the IFAC Secretariat staff members, retired and the new team, Elske Haberl and Katharina Willixhofer began their competent management of the office in Laxenburg.

2013 - Zurich - Council meeting

With the NMO additions of India and Algeria, the loss of Venezuela and Indonesia and the potential loss of Greece, Hong Kong, and Vietnam the number of Ordinary Members of the Council were potentially to be reduced by one member. This number is determined by the ByLaws requirements for to establish the number of Ordinary Members based on the number of IFAC NMOs from triennium to triennium. It would turn out that there were 12 Ordinary Members elected for the coming triennium.

IFAC's income was holding up nicely with about 40% coming from NMO fees and 60% from IFAC publications through its association with its publisher, Elsevier. The annual performance, well managed by the Treasurer assured that publications income exceeded guaranteed minima by a substantial amount and reserves remained well above established reserve requirements as established by the Council from time to time.

The journal program in general was robust and Automatica had reached its 50th year of success. As part of the acknowledgement of this success, the Publisher agreed with IFAC to open the 1963-2009 archive of Automatica papers for free access from July 2013 to September 2014. Since a very large percentage of downloads of journal papers are of the more recent papers there was not much concern that opening a 46- year window for free access might in some way interfere with the financial models of IFAC publications. That did not turn out to be a problem.

Unfortunately the ISI indexing problem for POL persisted. Numerous interactions with Thomson Reuters, the owner of the Institute for Scientific Information (ISI) had not yet resulted in routine indexing of POL papers and would lead to a new editorial model for the publication covering all IFAC symposium papers as described in the Publications chapter of this book. In addition, there was some concern expressed about the long term sustainability of the "third party" POL data base. It was finally decided to request that Science Direct, an Elsevier company, host POL and be part of new editorial model. That decision was to be reflected in the coming renegotiation of the PUMB contract.

There were several outputs from the task forces set up the previous year to implement some of the planning ideas from the strategic planning process. It was suggested that a glossy marketing document be prepared with target audiences of industry and government funding agencies. A new IFAC logo was proposed with a detailed user manual to help manage the IFAC brand. A newer IFAC website, You Tube channel, Facebook page, and blog were proposed for implementation in the coming year. It was also suggested that events, specifically for industry, be encouraged.

The idea for a new IFAC Journal with wide scope was presented. The criterion for accepting papers in this journal was to be quality with no concern about whether or not the technical topic was covered by the current technical committees. If the content involved control and the quality was high, that would be sufficient. A procedure for creating new journals was introduced to include three stages: proposing, evaluating, and deciding in that order. Issues of publication ethics as noted earlier would be rigorously followed. All of these ideas were works in progress that were well received by the Council. Funds were set aside to cover costs for each of these project areas.

The TB was taking a systematic look at areas in the control field that were underrepresented in the IFAC Journals and in the TCs as well. Coordinating Committee Milestone Reports for the coming IFAC Congress were being prepared but, consistent with an earlier decision, not all CCs would have Milestone reports at each Congress. In addition, electronic/virtual meetings of TCs and the TB itself were being tried and their use encouraged as well for conference planning and execution. Relatively few IFAC conferences were sponsored by a single TC; almost all had multiple TC sponsorship. More work was needed to evaluate the success of the 30 conferences held in the non-Congress years.

It was finally decided to eliminate the class of journals known as "IFAC Affiliated Journal". The experiment simply had not been effective and was difficult to manage. There was continued debate around the concept of a publications ethics committee. Details were to be examined and a final proposal brought to Council as soon as possible.

In order to generate more nominations for IFAC's major medals and Fellows it was decided to have separate search committees for both the major medals and Fellows. This had been standard practice in other international organizations. There were a few other awards matters discussed including whether or not non-English language textbooks could be considered for the Chestnut Textbook Prize. Outside the official IFAC languages as specified in the IFAC Constitution (English, French, German, Russian, Spanish) if there is an English language translation of a book, it is eligible to be considered for the Chestnut Prize.

IFAC's long time Treasurer Lino Guzzella had been elected Rector of ETH in Zurich and no longer could serve as IFAC Treasurer. Professor John Lygeros from the same university was selected as his replacement.

2014 - Cape Town - Council meeting

By this time the strategic planning process had come to the implementation stage and there was a flurry of activities underway to realize many of the goals set out in 2011 when the planning effort got underway. The several task forces that had previously reported were now carrying out their proposed actions. IFAC had a new logo including proposals for new standards regarding its use. Conference organizers were to be held to new standards that would present to the public a more easily recognized image of IFAC. In general, the IFAC brand was to be strictly followed in all its online and printed publications. Eligibility rules for appointment as an IFAC Advisor were implemented in a change to the IFAC Constitution.

With 48 NMOs in 2014, a reduction by one of the number of NMOs would reduce the number of ordinary members of the Council to 11 from 12. One way to enlarge the IFAC NMO membership number was to create, for the first time in IFAC's history one or two new categories of membership. A new NMO could take advantage of lower fees depending on the country's GDP and its previous status within IFAC, if there had ever been IFAC membership in the past. A task force was created to determine an execution plan for such an arrangement in preparation for eventual Council and General Assembly vote. These votes would presumably occur by electronic voting when the concrete proposal was ready.

Formal agreements had been reached and memorialized in the 2014 version of the PUMB agreement that POL would be moved to the Science Direct platform and in the future the plan was to scan papers from all available past IFAC Symposium proceedings but that latter step would not occur immediately. It was necessary to get the Science Direct operation in place and stabilized first. In conjunction with this move, IFAC would design a new editorial structure for POL probably using the TB structure to affect a POL Editorial Board to ensure quality control of POL inputs.

Some adjustments were being made in the IFAC Awards Program to augment the award nomination/search processes and move all awards including Fellows to a triennial schedule.

The new journal proposal had reached a positive conclusion so a search for an Editor-in-Chief began. It should be recalled that this new journal was to be a gold open-access journal with high quality and wide technical scope. PUMB and PubCom had signed off on this exciting new project. The project had been initiated by Frank Allgöwer, the nominated IFAC President-Elect whose presidential term will be from 2017 to 2020. Berlin was to be approved as the 2020 Congress venue.

Way back in 1996 IFAC began to use the Congress week to conduct training sessions of the TB leadership including the TC Chairs. By now this was a regular event each three years and it was now proposed to expand these trainings to IFAC entities to other parts of the IFAC organization including Symposium NOC chairs, IPC Chairs, and Symposium Editors. Thus another feature of the Congress would be a set of trainings for anyone interested in future IFAC leadership roles.

Recognizing that the 60th anniversary of IFAC would occur in 2017, the IFAC President Janan Zaytoon stated that he planned to have IFAC history be one theme of the Congress in Toulouse. He asked IFAC Advisor Steve Kahne to prepare a history of IFAC in an appropriate form and produce it in time for the Congress. An IFAC History Task Force was created and assigned that task under Kahne's leadership.

2014 - Cape Town - Congress

This is the first time that the IFAC World Congress was held in an African country. The 19th IFAC World Congress took place in Cape Town, South Africa. About 2,000 papers were presented at this Congress, which made it by far the largest event in the control field ever to be held in the southern hemisphere. The successful effort was spearheaded by the 20th IFAC President Ian Craig, the Organizing Committee Chair Fernando Camisani, and two IPC Co-Chairs Edward Boje and X. Xia.

In summary, there were 2,648 submissions, from which 1,999 were selected to be presented in 25 parallel tracks of 56 invited sessions and 13 interactive sessions. A total of 6,500 authors representing 73 countries presented their scholarly work. It is important to note that 156 authors represented 11 African countries.

The following keyword ranking shows interest of the community:

Smart grids	109
Motion Control Systems	95
Control of renewable energy resources	95
Multi-agent systems	94
Optimal operation and control of power systems	87
Modelling and simulation of power systems	87

Countries with more than 30 attendees:

China - 253

Germany - 186

France - 185

United States - 138

Italy - 108

Sweden - 91

United Kingdom - 87

Japan - 82

South Africa - 70

Australia - 59

Brazil - 57

Netherlands - 51

Spain - 47

Russian Federation - 46

Switzerland - 43

Republic of Korea - 36

Denmark - 34

Czech Republic - 34

Canada - 33

Austria - 33

An excellent set of eleven plenary lectures were presented at the Cape Town Congress. Five plenaries were given in the mornings.

On Monday morning, the first plenary session “Coordinated control of multi-agent systems: Lessons from collective animal behavior” was given by Naomi E. Leonard, Princeton University, USA. She reviewed recent work on models and methods for studying the mechanisms of collective dynamics in animal groups. She described system theoretic tools used to prove how collective behavior depends on parameters that model the individual agents, the network interconnections, and the environment. She also discussed how these developments lay foundations for systematic control design methodologies that endow engineered multi-agent systems with the remarkable features of animal groups.

On Tuesday morning, David Vos, Tebogo LLC, USA, described “Safety critical control systems: A manned and unmanned autonomous aircraft perspective.” His presented the current state of the safety critical control systems from an aircraft perspective and highlighted domains in which much technological development was needed. Such domains included systems engineering, software development, redundancy management, control and estimation theory, requirements development and tracking, as well as concomitant design, development and testing techniques, tools and methodologies in order to leverage the enormous value brought by highly automated Safety Critical Systems.

On Wednesday morning, Lei Guo of Chinese Academy of Sciences, presented “How much uncertainty can the feedback mechanism deal with?” In this lecture, He mainly considered discrete-time (or sampled-data) nonlinear dynamical control systems with both structural and environmental uncertainties. He presented a series of “Critical Values” and “Impossibility Theorems”, concerning the maximum capability of the feedback mechanism for several basic classes of uncertain nonlinear control systems, and expanded on their theoretical implications as well as their practical significances.

On Thursday morning, Mustafa Khammash, ETH Zurich, Switzerland, presented “Cybergenetics: Feedback control of living cells at the gene level”. This presentation described novel analytical and experimental work that demonstrated how de novo control systems implemented with stochastic components can be interfaced with living cells and used to control their dynamic behavior. The feedback systems could either be realized on a computer (in-silico control) or through genetically encoded parts (in-vivo control). The two approaches were

compared and contrasted, and applications in biotechnology and therapeutics were described.

On Friday morning, Richard Murray, California Institute of Technology, CA, USA, presented "Specification, verification and synthesis of networked control systems," The talk focused on the rigorous specification and systematic synthesis of decision-making logic for hybrid systems. This decision-making logic is responsible for selecting modes of operation for the underlying (continuous) control system, reacting to external events and failures in the system, and insuring that the overall control system is satisfying safety and performance specifications. A major shift from "design then verify" to "specify then synthesize" approaches to controller design that allow simultaneous synthesis of high-performance, robust control laws and correct-by-construction decision-making logic was explained. Examples in autonomous vehicles and aircraft electrical power distribution systems were given.

Plenary speeches were also given in late afternoons.

On Monday, two presentations were given by Heinrich Frontzek, Festo AG, Germany and Hajime Asama, University of Tokyo, Japan. The first talk was "Bionic Learning Network - Inspired by Nature" by H. Frontzek, which discussed the Bionic Learning Network in which Festo cooperates with renowned universities, institutes and companies to develop technical applications and industrial practice that are inspired by principles from nature.

The second talk was "Robot and remote-controlled machine technology for accident response and decommissioning of the Fukushima Daiichi Nuclear Power Plant", by Hajime Asama, which discussed how remote-controlled machine technology including robot technology (RT) has been utilized in the emergent situation of the accident, and what kind of technology is still demanded for decommissioning. He analyzed why the robot technology developed in the past projects in Japan could not be introduced smoothly in the emergent situation, and issues were discussed how we should prepare for the future possible disasters and accidents, including not only technological development but also maintenance of technology, training of operators, establishment of mockups and test fields, and political strategy.

On Tuesday, two presentations were given in parallel by Ernst Scholtz, ABB US Corporate Research, USA and Thomas Jones of Stellenbosch University and S-Plane Automation (Pty) Ltd, South Africa. The first presentation was "The Evolving Electrical Grid: From Slow and Passive to Fast and Active", which provided an overview of changes that the entire electrical energy supply chain was being transformed was given before elaborating on a challenging power-transport control problem. A DC Supergrid to access and integrate remote renewables into the rest of the electrical energy supply chain has been proposed in the past, but technical hurdles have stood in the way of realizing such a grid. In this talk, solutions of how to oper-

ate a HVDC grid in tandem with existing AC systems were discussed, ultimately showing that by using more power electronics (e.g. HVDC) grids could be transformed into active systems with improved response.

The second presentation was “Large transport aircraft: Control challenges of the future,” which is focused on the evolution of projects within this partnership, serving Airbus centers of competence in France, Germany and the UK. Goals range from improving efficiency (e.g. applying shape memory alloy actuators) to improvements in safety (e.g. automatic return to flight envelope and conflict avoidance near airports) and general automation (e.g. automatic in-flight refueling). He illustrated how detailed analysis and the application of advanced techniques may often lead us to relatively simple answers and quite general conclusions.

On Wednesday evening, “The impact of Model-Based Design on Controls, Today and in the Future.”, was presented by Jack Little, MathWorks Inc., USA. In this talk, he reviewed the role of model-based design in the proliferation of controlled and smart systems, as well as changes in controls education and research. He then looked forward to the future of Model-Based Design, and how it is evolving to help researchers and developers looking at the challenges of cyber-physical systems, distributed systems, and other systems of the future.

On Thursday evening, Joseph. Z. Lu of Honeywell Process Solutions, USA, introduced and discussed “Bridging the Gap between Planning and Control: A Cascaded MPC Approach”. He stated that control and planning are almost always coupled. Planning relies on control to establish the feasible region for optimization, while control relies on planning to run the plant at the most profitable operating point. He proposed a new 1-to-n MPC cascade strategy for bridging the gap between planning and control and for improving operating profitability. The proposed 1-to-n MPC cascade strategy filled the void of gate-to-gate optimization as part of an automatic control system.

There were special panel sessions on:

- How to better connect academic research and industry practice;
- How the control field can increase its impact and suitable funding opportunities.

The technical program of the Congress was concluded with a new innovation for an IFAC World Congress - a public lecture that demonstrated the astounding athletic power of quadrocopters in a specially constructed flying machine arena. A special history project formed part of the 19th IFAC World Congress, in which the ‘IFAC 2014’ meeting rooms were named after the 20 IFAC Presidents. A poster of each president was displayed in front of the corresponding meeting room. and included the new IFAC branding, a picture and short biography of the particular president, as well as the banner of the Congress for which the president was responsible. Copies of these posters were handed out to the past presidents or their

representatives during a special ceremony on 25 August 2014 as part of the General Assembly meeting of IFAC.

Many delegates fondly remember social events held during IFAC 2014. The Congress was officially opened by the South African Minister for Science and Technology, Minister Pandor, who impressed delegates with the articulate manner in which she addressed pertinent issues. The entertainment during the opening and closing ceremonies also received high praise.

Chapter II

The IFAC NMO History

The first International Conference on Automatic Control was held at the University of Heidelberg from 25 to 29 September 1956. The conference was called "Regelungstechnik – Moderne Theorien und ihre Verwendbarkeit" (Control Engineering – Modern Theories and their Application) and was organized by the German VDI/VDE-Fachgruppe Regelungstechnik founded in 1938. During the conference, thirty participants signed a declaration in which the need to create an international organization of automatic control was clearly defined. The notion of national member organizations (NMO) was a central concept in these initial efforts, with the signatories pledging to promote the formation of national organizations, if they were not already in existence at that time. At the end of the Heidelberg Conference a Provisional Committee under the chairmanship of Victor Broida (France) with members Grebe (Germany), Letov (USSR), Nowacki (Poland), Oldenburger (USA), Welbourn (UK), and Ruppel (Germany), was established to draft a constitution for the planned International Federation of Automatic Control. The organization, the International Federation of Automatic Control (IFAC) was officially formed by the adoption of a constitution at a meeting held in Paris on 11th and 12th September 1957. The constitution, restricted membership to one organization from each country and therefore many joint councils or committees of existing scientific and technical bodies, within a country were formed to represent them as members of IFAC.

On September 12, 1957, the First General Assembly convened at the constituent meeting in Paris. Delegates from 18 countries representing their national organizations assembled at the Conservatoire National des Arts et Métiers under the chairmanship of Victor Broida. They voted on the Constitution and By-Laws; elected the first President, Harold Chestnut, as well as members of the Executive Council and they appointed committee chairmen.

The first constitution stated that for each country, one scientific or professional engineering organization, having a strong interest in automatic control and a sound professional background, or one council formed by two or more such organizations, shall be eligible for membership of IFAC. Such organizations, after admission to IFAC, will be known as National Member Organizations (NMOs) and shall have a responsibility for furthering the aims and objectives of IFAC within their respective countries. This statement still appears in the current constitution (see the IFAC Website) and thus the relationship of IFAC with its NMOs has been enduring throughout the history of the organization. The current constitution, in addressing the need to be inclusive across the globe, has introduced levels of membership,

which recognize differences in the economies of potential members. It is also recognized that within some countries involvement with automatic control is long established, whereas other countries' involvement with automatic control may be developing. The current three categories within which applications for membership may be made are:

– Ordinary membership category

– Reduced-fee membership category

– Introductory membership category

The reduced-fee membership category applies only to NMOs from countries for which the gross domestic product and the gross domestic product per capita fall outside of the top fifty, where countries within the top fifty have the largest gross domestic product and/or gross domestic product per capita. The introductory membership category applies only to countries for which no NMO has been a member of IFAC for the last three years. NMOs in the reduced-fee and introductory membership categories have restricted rights as detailed in the IFAC By-laws. NMO membership is agreed or terminated by a vote of the General Assembly, which is the supreme body of the Federation comprising delegations from all the NMOs, excluding those in the introductory membership category.

Throughout history, the NMOs have been crucial to the success of IFAC. They nominate members of IFAC Technical Committees and work tirelessly to organize IFAC Conferences, Symposia and Workshops in their countries. Many also lead automatic control activities and provide significant influence within their own nations. Although working with a unified relationship to IFAC, different NMOs work in different ways with each having their own rich history and achievements. This Chapter seeks to celebrate the work of IFAC NMOs through history. As well as providing a historical perspective, this Chapter also seeks to provide a useful resource for developing NMOs by providing information on ways in which it is possible to organize an NMO and ideas for both activities within IFAC as well as in-country activities. Several NMOs have produced extensive records of their history – as can be viewed in the appendices in Chapter V. These are available at the IFAC Secretariat. At this time approximately half of the countries with NMOs have provided historical contributions to this history document and the IFAC History Task Force is very grateful for their cooperation and support. These contributions have been created by the local NMOs and are linked to the table below. It is our hope that this Chapter will constitute a living document and that all NMOs will eventually be represented. Revisions and updates may be submitted to the IFAC Secretariat for inclusion in future versions of this book.

IFAC Membership NMOs

NMOs from various countries have joined (and occasionally left) IFAC over the decades. The following table shows these dates for each country that has been represented in IFAC's General Assembly since the founding of the organization. From time to time a new national organization will take on the role of IFAC NMO in a particular country. If there is no break in IFAC membership for a particular country such changes are not reflected in the data shown in this table. Links from table entries to historical contributions from the various NMOs are indicated. As noted above the IFAC Secretariat has history booklets of several NMOs. These are marked with an asterisk in the table below:

NMOs

Country	Membership Years	History available at Secretariat
Algeria	1971-1981; 2013	
Argentina	1960	
Australia	1966	*
Austria	1957	*
Bahrain	2002-2005	
Belgium	1958	
Brazil	1977	
Bulgaria	1960-1994; 2003	
Canada	1960	
Chile	1982	
China	1958	
Colombia	1995-2002	
Croatia	1993	
Cuba	1965-1995;2001	
Czechoslovakia	1958-1991	
Czech Republic	1992	
Denmark	1957	
Egypt	1963-1990;1994-2002	
Estonia	1993	
Finland	1959	

Country	Membership Years	History available at Secretariat
France	1960	*
Germany	1971	
Greece	1964-2013	
Hong Kong	1989-1997; 2011-2013; 2015-2016	
Hungary	1957	
India	1959-1994; 2011	
Indonesia	1995 - 2013	
Iran	1974-1982; 1992-2004	
Ireland	1981-1987; 2007	
Israel	1958	
Italy	1957	*
Japan	1958	*
Korea, dem. Peoples Republic	1965 - 1994	
Korea, Republic of	1987	
Kosovo	2009	
Kuwait	1987-1999	
Latvia	1993-2005	
Lithuania	1993	
Macedonia, former Yugoslav Rep,	1993	
Malaysia	1995-1998; 2016	
Mexico	1970	
Morocco	1978-1993	
Netherlands	1958	
New Zealand	1989-2003	
Nigeria	1987-1990	
Norway	1958	
Pakistan	1989-1993	
Peru	2011	

Country	Membership Years	History available at Secretariat
Poland	1957	
Portugal	1982	
Romania	1958	
Russian Federation	1993	
Singapore	1987	
Slovakia	1993	
Slovena	1993	*
South Africa	1963	*
Spain	1966	
Sweden	1958	
Switzerland	1958	
Tunesia	2010	
Turkey	1958	
Ukraine	1993	
United Kingdom	1958	
USA	1957	*
USSR	1957-1992	
Venezuela	1981-1985; 2007-2012	
Vietnam	2000-2014	
Yugoslavia	1960-1992	

In Chapter V Facts & Figures you can read more about the history of individual NMOs

Chapter III

IFAC Technical Activities

Technical Committees, Symposia and the Technical Board

IFAC was formed to promote international cooperation in research on Automatic Control. International cooperation in research essentially means open technical meetings (Conferences, Symposia, Workshops) and the forming and spreading of publications. The history of IFAC's publications is covered in the Publications Chapter so the focus of this chapter will be on how the meetings took form and were organized.

The information in this chapter complements that presented in other chapters since the Technical Committees are such an integral part of IFAC. The current section will contain information about the technical activities, the formation and dissolution of Technical Committees, the organization of technical meetings and so on. This chapter is divided into three parts: part one gives a brief history of how the current structure was developed, part two treats the evolution of the Technical Committees, and part three deals with the structure of Symposia and technical meetings.

1958-1978: The first two decades

The first joint meeting of IFAC's Executive Council and the “Advising Group” was held in Zürich, March 13, 1958. The focus was entirely on the upcoming Congress in Moscow 1960. The council acted as a program committee for the congress and discussed organizational details. Formation of technical committees was briefly discussed, but apparently no decision was made until the next Executive Council meeting in Rome, March 4-6, 1959. There, Donald Eckman presented the recommendations from the Advisory Committee as follows:

“It is the duty of the Advisory Committee to provide overall directions and guidance to the Executive Council regarding the technical work of IFAC. It recommends formation of technical committees, outlines of area of work and recommends the membership and chairman of technical committees”.

At the same meeting six technical committees were formed, which essentially still form the backbone of IFAC’s structure for technical activities.

The duties of the committees were formulated as:

1. Preparations for Congresses and other special meetings

2. Preparation of a biennial review of the technical state of art

3. Exchange of information of more specialized nature

4. Preparation of exchange of standards or specifications

5. Preparation of special symbols or terms

6. Outlining special areas of work

This role of the Advisory Committee and the Technical Committees was reconfirmed in the Constitution and By-laws adopted by the General Assembly in Chicago, September 17, 1959.One may note that the Executive Council Meeting in Rome (1959) also was heavily involved in the Congress preparation, even with a nationality “pre-allocation” of paper slots at the Congress (USSR and USA 50 each, and e.g. Sweden 3 papers). It must be recalled that preparations of the International Congress were to be held in the Soviet Union at a time when East-West concerns were very much in evidence. Thus an “appropriate” balance between technical papers at such a meeting was an important criterion for success. Paper allocations and attendance at the Congress were strongly influenced by the politics of the day. At this first Congress a national balance was of primary importance.

The direct role of the Technical Committees (TC) for the Congress programs continued for the second IFAC Congress in Basel (1963). At this congress the emphasis shifted from national to technical. Which could be determined by how the “paper slots” were allocated to the committees at the April 1961 meetings: 40 papers to the TC on Theory, 40 papers to the TC on Applications, 10 papers to the TC on Components, 5 papers to the remaining TCs (Education, Terminology and Bibliography).

Much of the work for the TCs continued to center on Congress Program activities for quite some time. For example, as late as the Helsinki Congress in 1978, the Theory Committee spent long hours on reviewing papers and allocating them to sessions.

The number of technical meetings, in addition to the Congresses continued to increase, which shifted the focus of the Advisory Committee and the TCs towards outlining special areas of work.

Advisory Committee Chairmen 1958-1981

Donald Eckman	USA	1958-62
Harold Chestnut	USA	1963-66
Alexander M. Letov	USSR	1966-69
William E. Miller	USA	1969-72
Oleg Aven	USSR	1972-75
Roland G. Lex	USA	1975-78
Antti Niemi	Finland	1978-81

1978-1990: Establishing the Technical Board

It is clear that the Advisory Committee was a very busy group. Between 1966 and 1976, the number of technical meetings to oversee, increased by a factor of four. It was felt that the Advisory Committee was not spending enough time on technical matters.

The first constitution of IFAC (1959) does not clearly explain the role and charter of the Advisory Committee, leaving the command structure of IFAC vague. An ad hoc Constitution Committee (Coales, Gertler, and Kahne) was set up in 1976 with the task to suggest a new organization for the work of the Executive Council. This committee reported to the General Assembly (GA) in Kyoto, 1981. It was suggested to create a Technical Board (TB) under the Executive Council (renamed to "Council") that would handle the Technical Committees and the Technical Meetings. The GA suggested a three-year test period and a final decision should be taken at the General Assembly of 1984 in Budapest.

Professor Boris Tamm was the first TB chairman. Tamm was Rector of the Technical University of Tallinn in Estonia and would later be elected IFAC President. He led the work of the Technical Board in the 1981-84 triennium so successfully that the new IFAC structure was adopted as a permanent solution at the GA of 1984.

Professor Brian Anderson from Australia had extensive international research connections in control theory, and became the second TB chairman. He fine-tuned the operation of the TB into a smooth and well functioning business. The efficient approval procedures for symposia and the reporting by the TCs showed that the TB was an effective way to handle the technical activities of IFAC.

Professor Lennart Ljung from Sweden, was the TB chairman of the 1987–1990 triennium. Substantial effort was spent on the structure of the technical meetings, as well as a Master Plan for IFAC Symposia.

Technical Board Chairmen 1981-2017

Boris Tamm	(USSR) Estonia	1981-84
Brian Anderson	Australia	1984-87
Lennart Ljung	Sweden	1987-93
Vladimir Kucera	Czech Republic	1999-2002
Rolf Isermann	Germany	1999-2002
Michael Masten	USA	2002-05
Sirkka-Liisa Jämsä Jounela	Finland	2005-08
Iven Mareels	Australia	2008-14
Francis J Doyle III	USA	2014-17

1990-2002: Restructuring the Technical Board

Lennart Ljung continued as TB chairman for the 1990–1993 triennium. During this time the TB had well thought out routines to handle the TC reports and the proposals for technical events. A problem was that the original TC organization had grown into a structure that lacked balance and logic. It was decided to try to cast the existing TCs and Working Groups (WGs) into a new mold with scopes that would be easier to maintain and develop. A newly formed task force proposed a solution to create nine Coordinating Committees (CC) that replaced the TCs in the TB and this was decided upon during the GA in Sydney (1993). The CCs contained the earlier TCs and WGs.

Vladimir Kucera, TB chair of the 1993–1996 and the 1996-1999 triennia took on the practical organization of CCs and TCs as his main task. This was a very important undertaking and at

the GA in San Francisco (1996), it was noted that the new TB structure had “responded well” to the challenges of the rapidly developing area of automatic control. The new structure brought some innovative features into the Congress preparation, such as tutorial workshops organized prior to the start of the Congress. Kucera's second term as TB chair brought further amendments and additional adjustments were made to the CC and TC structure.

It was during Rolf Isermann’s tenure as TB chairman during the 1999–2002 triennium, that the TB was subjected to a major reorganization. This was motivated by the need to react swiftly to changes in the field and to avoid inactivity. It left the organization of CCs and TCs to what essentially exists today. During this period, the TB developed the Milestone Reports, which flag major technical advances during the triennium. a feature appreciated by all.

2002-2014: Consolidating the Technical Board

Michael Masten, the TB chairman for the 2002- 2005 triennium, ran a very smooth operation, and was able to handle 86 proposals for technical events, within the target timeframe of 6 weeks. During his tenure, all TCs had their own web pages, linked to the IFAC web system, and produced their annual reports on time. A new TC on network systems was added to the structure. Beginning in 2005, and propelled by Masten, a training session was implemented at the start of each Congress for members of the TB and the TC chairs and anyone else who was interested.

Sirkka-Liisa Jämsä Jounela, the TB chairman of the 2005-2008 triennium, developed a TB website with an efficient TB information system and a new selection mechanism for Technical Committee Chairs. This was an important step forward in implementing even more efficient quality control. The size of the operation was impressive with 40 TCs, and a total of 1800 TC members.

Iven Mareels, the TB chairman for the 2008-2014 triennia, evaluated the activities of all TCs, assessing strengths and weaknesses, which created new processes for terminating TCs and starting up new ones. In fact, during his term, 2 TCs were terminated, two were merged and one new TC was created. Additionally the manuals were cleaned up and the instructions to volunteers reworked.

Under Mareels's guidance the technical evaluation process was transferred to an online system, supported by a database, enabling future data mining and decision support. During his second triennium, a significant increase in participants at IFAC events could be noted. In 2014 there were approximately 2050 volunteers from 61 countries serving on the Technical Committees.

Present Scope of the Technical Board

All these developments led to how the Technical Board functions today, which is described as follows on the IFAC website:

"The paramount purpose of IFAC is to promote automatic control and technology, and the primary means to achieve these goals is organization of timely technical meetings and publication of archival journals. The Technical Board (TB), responsible for maintaining technical excellence of all IFAC activities, is composed of the Coordinating Committees (CCs) responsible for technical meetings and other TB members who work together with and provide technical assistance to IFAC journal editors and publications committees, congress organizers, and other IFAC volunteers and functions.

Each CC consists of a number of Technical Committees (TCs), which are responsible for planning and monitoring technical events, such as symposia, conferences, and workshops, with the NMOs acting as hosts. The TCs also promote their respective technical areas in other ways such as establishing contacts with international organizations, providing cooperation among specialists in their particular field, promoting interest in emerging control fields, and publishing reports on selected topics".

The TB as Seen From the Perspective of an Outsider

The average person interested in control - an engineer, student or researcher - may not have a direct interest in the organization or internal business of the TB. He or she, however, will see the results of those activities in the conferences and symposia that are organized, the topics promoted, and how the paper selection is made. This may influence the person's willingness to participate in the international technical control discussion.

The question arises on how to get involved in IFAC and influence the decisions that affect the structure of the technical meetings.

The first step is to become an IFAC Affiliate. This can be described as a "personal membership" in IFAC (created in 1990), as a complement to IFAC that is an organization of national member organizations (NMO).

The second step is to become a member of a Technical Committee. In the early days of IFAC that was a process that was controlled by the NMOs: The IFAC Constitution of 1959 stipulates "Although the Technical and Special Committees should be small, each NMO may recommend members to the chairmen of these committees. The members of each Technical and Special Committee shall, with the concurrence of the Advisory Committee, be selected by the Committee chairman."

At this time the procedure is more leisurely. Most technical committees hold open meetings at the related symposia. Anyone can attend, and active participation may be a route to mem-

bership of the TC with a continued path to symposium program committees and further IFAC duties.

The Evolution of Technical Committees

The reason for forming IFAC was to promote international technical contacts between researchers and engineers in Automatic Control. Therefore, it was decided to form Technical Committees (TC) on subtopics. At the very first Joint Session of the Executive Council and the Advisory Committee ("Advisory Group"), in Zürich, March 13, 1958 it is decided that the Advisory Group should prepare a discussion on technical committees. With the lack of open communication during World War II, there were few standards for terminology, symbols, and no standard language existed for automatic control. Even existing textbooks that were translated into several languages used different terms for the same idea. This is the main reason IFAC eventually created multi-language glossaries as discussed in the Publications Chapter. Two technical committees were formed with a focus on standardization:

The Bibliography Committee, with Chairman Prof. Winfried Oppelt

The Terminology Committee, with Chairman Prof. Eduard Gerecke

At the Executive Council meeting in Rome (March 4-6, 1959), four new TCs were formed:

Applications

Components

Education

Theory

So, even before the first congress in Moscow, IFAC had 6 technical committees.

In the 1960s they were complemented by:

Space

Systems Engineering

In 1972, a TC on Computers was established.

At the Boston/Cambridge Council meeting in 1975, three more TCs were created:

Biomedical Engineering and Control

Manufacturing Technology

Mathematics of Control

Some time around 1976, also the TCs on Economics and Management, Social Effects of Automation were formed.

In 1978 a TC on Developing Countries was added. So at the Helsinki Congress (1978), IFAC had 14 Technical Committees that remained essentially unchanged until 1993 when the TB was entirely restructured (A TC on Automotive Control was created in 1992).

The concept of Working Groups was formed. At the Joint Meeting of the Executive Council and Advisory Committee in Bergen, March 20, 1961, the TC on Theory reported the formation of four subcommittees: Continuous Control; Discrete Systems; Adaptive Control; Finite Automata; several TCs adopted this form of organization.

The original division of the control field into committees (Theory, Applications, Components, Education, Terminology) was natural. As the area of control expanded and developed, more committees were needed, although it was difficult to maintain balance, logistics, and coordination. How can you have one Applications Committee in parallel with committees on five or six specific application areas? What is the distinction between the Theory committee and the Mathematics of Control committee? How do you balance the workload in organizing technical meetings, e.g. the Theory Committee and the Committee on Terminology and Standards? Occasional friction did arise between different TCs. To solve these problems, it was important to carefully formulate the scopes for the committees and by creating Working Groups (WG) in these different committees with more specialized subjects. A proliferation of WGs occurred in the 80s, and in 1990 there were a total of 46 WGs, quite unevenly distributed over the TCs. There was pressure from some WGs to be “upgraded” to TCs, while at the same time it was very difficult to abolish an existing TC.

While the TB struggled with these structural issues during the 1990-1993 triennium, a task force was formed and the suggestion emerged to reorganize the structure by elevating all well-functioning WGs to TCs. That required a change in the constitution, since all TC chairpersons would no longer be members of the TB. At the General Assembly in Sydney (1993) there was a constructive discussion of these issues. The number of delegates present at the GA was not sufficient for a change of the constitution, so a formal decision had to be taken by a postal ballot among the NMOs. What emerged from this process was fine tuned in the following triennium, and it became the current TB structure with 41 Technical Committees organized into 9 Coordinating Committees (CCs).

Since the CC chairpersons are members of the TB, it might be said that the number of TCs was reduced to 9 CCs, now each with a well structured set of “Working Groups” now called TCs.

The development is summarized in the following table:

The History of IFAC's Technical Committees 1959-1993

Name	Dates	In Current Structure
Aerospace	1963 - 1993	TC 7.3
Applications	1959 - 1993	CC4, CC6 and CC7
Automotive	1992 - 1993	TC 7.1
Bibliography	1959 - 1964	
Biomedical Engineering and Control	1975 - 1993	CC8
Computers	1972 - 1993	CC3
Developing Countries	1978 - 1993	TC 9.3
Economics and Management	1976 - 1993	TC 5.2
Education	1959 - 1993	TC 9.4
Manufacturing Technology	1975 - 1993	CC5
Mathematics of Control	1975 - 1993	CC1 and CC2
Social Effects of Automation	1976 - 1993	TC 9.2
Systems Engineering	1968 - 1993	TC 5.3 and TC 5.4
Terminology	1959 - 1993	
Theory	1959 - 1993	CC1 and CC2

It took some time to settle into the new structure and the TBs, under the leadership of Vladimir Kucera and Rolf Isermann, who worked hard during the period of 1993-2002 on figuring out the best way to organize TCs and CCs,

First, during 1993-1996, 9 CCs were constructed:

1. Systems and Signals

2. Design Methods

3. Computer Control

4. Systems Engineering and Management

5. Manufacturing and Instrumentation

6. Industrial Applications

7. Transportation and Vehicles

8. Life Support Systems

9. Global and Educational Issues of Automation

In response to the experiences of the structure, as well as technical developments in the field, a major rearrangement took place in 2002. A new CC was created: Mechatronics, Robotics and Components (taking TCs from CC 5)

At the same time the CC4 Systems Engineering and Management was abolished and its scope was distributed to the new CC and to CCs 5 and 9 in the above list.

Also, CC8 changed name to Bio and Ecological Systems, CC3 to Computers, Cognition, Communication, and CC9 to Social Systems.

Since then, the structure has been stable, with occasional name changes, but without major changes in scope. For example CC6: Industrial Applications was renamed to Industrial Systems in 2002, to Process and Power Systems in 2005 and back to Industrial Systems in 2014.

The structure of the technical board and the technical committees is a constant concern for IFAC. The IFAC president Ian Craig initiated a task force in 2012, led by Frank Doyle, to analyze the technical fields in the Automatic Control area to draw conclusions how IFAC can fully exploit the current developments. The task force formulated 15 specific recommendations that formed a basis for actions to 2017 and beyond. The IFAC website always reflects the current TB structure.

The Current Organization of the Technical Board

CC: Coordinating Committee. TC: Technical Committee

CC1 SYSTEMS AND SIGNALS

- TC 1.1 Modelling, Identification, and Signal Processing
- TC 1.2 Adaptative and Learning Systems
- TC 1.3 Discrete Event and Hybrid Systems
- TC 1.4 Stochastic Systems TC1.5 Networked Systems

CC2 DESIGN METHODS

- TC 2.1 Control Design
- TC 2.2 Linear Control Systems
- TC 2.3 Non-linear Control Systems
- TC 2.4 Optimal Control
- TC 2.5 Robust Control
- TC 2.6. Distributed Parameter Systems

CC3 COMPUTERS, COGNITION AND COMMUNICATION

- TC 3.1 Computers for Control
- TC 3.2 Computational Intelligence in Control
- TC 3.3 Telematics: Control via Communication Networks

CC4 MECHATRONICS, ROBOTICS AND COMPONENTS

- TC 4.1 Components and Technologies for Control
- TC 4.2 Mechatronics Systems
- TC 4.3 Robotics
- TC 4.5 Human-Machine Systems

CC5 MANUFACTURING SYSTEMS

- TC 5.1 Manufacturing Plant Control
- TC 5.2 Manufacturing Modelling for Management and Control

TC 5.3 Enterprise Integration and Networking

TC 5.4 Large Scale Complex Systems

CC6 INDUSTRIAL SYSTEMS

TC 6.1 Chemical Process Control

TC 6.2 Mining, Mineral and Metal Processing

TC 6.3 Power and Energy Systems

TC 6.4 Fault Detection, Supervision & Safety of Technical Processes

CC7 TRANSPORTATION AND VEHICLES SYSTEMS

TC 7. 1 Automotive Control

TC 7.2 Marine Systems

TC 7.3 Aerospace

TC 7.4 Transportation Systems

TC 7.5 Intelligent Autonomous Vehicles

CC8 BIO AND ECOLOGICAL SYSTEMS

TC 8.1 Control in Agriculture

TC 8.2 Biological and Medical System

TC 8.3 Modelling and Control of Environmental Systems

TC 8.4 Biosystems and Bioprocesses

CC9 SOCIAL SYSTEMS

TC 9.1 Economic, Business and Financial Systems

TC 9.2 Social Impact of Automation

TC 9.3 Smart Cities

TC 9.4 Control Education

TC 9.5 Technology, Culture and International Stability (TECIS)

Structure of Conferences and Technical Meetings

The concept of an IFAC Symposium

From the start, the IFAC congresses were the backbone of the external IFAC activities. The congresses follow a fixed triennial schedule and are planned well in advance. The control community gets timely information about when and where the next congress will be held. This strategy has been very successful over the years. Arranging a congress is one of the main tasks of the IFAC President since by tradition each Congress is organized in the home country of the President.

The necessity arose to have more specialized technical meetings with a well-defined rather narrow scope. This was discussed as early as the Moscow Congress of 1960, and plans were made for two Symposia in 1962. The minutes of the Executive Council's meeting in Bergen, March 20, 1961 gives a clear picture of the goals of IFAC for organizing such symposia:

"Mr. Trapeznikov (USSR, Director of the Institute of Automation and Telemechanics in Moscow, present at the meeting as a proxy for Boris N. Petrov, Chairman of the Theory committee*): On behalf of Mr. Petrov it is suggested that the Theory Committee should organize two symposia in 1962 on*

1) Theory of algebraic relay schemes and definite automata, which may perhaps take place in Czechoslovakia if the National Member Organization agrees to it;

2) Self-adaptive systems, perhaps to be held in France, Italy or UK, that is any European country willing to comply.

Mr. Ruppel (West Germany, Honorary secretary of IFAC) raised the question of who is taking care of the scientific program of the symposium.

Mr. Trapeznikov (USSR, Director of IAT): The main program will be prepared by the Theory Committee keeping in touch with the National Committee. The organization is left to the National Committee in the country where the symposium will take place.

Mr. Letov (USSR, then IFAC President): The procedure should be as follows: First the Executive Council has to take a decision on the proposal of Mr. Petrov. The next step would be to choose a country for the symposia to be held and the chairman of the theory committee will contact the respective National Member Organization to make sure of its willingness. He will then elaborate a program in co-operation with the National Member Organization concerned.

Mr. Coales (Great Britain, Member of the Executive Council, IFAC President 1963-1966): "There cannot be any objections raised against Technical Committees arranging symposia on subjects, which they consider suitable at any particular time. This is actually the duty of the Technical Committees. The Executive Council should give approval in principle and leave the

organizational problems and other details to the respective Committee Chairman. This procedure is preferable to our sponsoring symposia, which are arranged by national organizations".

Mr. Eckman (USA, Member of the Executive Council) pointed out that there might be a possible conflict with the IFAC Congress in 1963, if these two symposia are intended for 1962. It is possible that only secondary (papers) will be delivered for the symposia and the best ones held back by the authors for the congress.

Here we see, from the earliest days of IFAC, all the basic elements of an IFAC sponsored technical meeting: The technical committees should be the initiators (in fact this may be seen as the main tasks of the committees). An NMO should accept the practical task for the organization as well as the financial responsibility and risk. The Executive Council (later the Advisory Committee and subsequently the Technical Board) should approve the proposal for the event before it could be called an IFAC Symposium. At the same time the organizers should respect the IFAC Congresses and not steal the thunder from them. Getting approval for Symposia in Congress years, was very difficult, and is still an unusual occurrence.

So in 1962, two IFAC symposia were organized. The very first IFAC Symposium was:

"The first International Symposium on Optimizing and Adaptive Control sponsored by Theory Committee of International Federation of Automatic Control"

It took place in Rome, Italy on April 26-28, 1962.

The second one was a Symposium on Relay Systems in Moscow, 1962.

This was followed by two more meetings in 1964, four in 1965, and so on.

In 1971, the first IFAC Workshop took place (IFAC Workshop on Higher Education in Automatic Control, Dresden, 1971, sponsored by the Education committee). IFAC workshops were created to be more informal and less structured than symposia, addressing a more limited audience.

Proliferation of Technical Meetings

By the time of the Kyoto Congress in 1981, IFAC had organized 84 Symposia and 24 Conferences/Workshops, in addition to the Congresses. These were on very diverse topics such as

Self-adaptive systems

Stochastic control

Relay systems

Computer applications in the automation of shipyard operation and ship design
Information control problems in manufacturing technology

All automatic control problems in the peaceful uses of space, including automatic control problems in the biosphere, aeronautics and underwater automatic vehicles

Optimal system planning

Systems engineering education in developing nations

Automation in mining, mineral and metal processing

Digital control of large industrial processes

Several of these events were not repeated with the same scope.

As a consequence, the structure of the technical meetings became blurred. For the external control community, the organizational issues of IFAC are not so important. What matters externally is how IFAC manifests itself by service to the community in terms of symposia, conferences, workshops and publications. In that sense, IFAC was not as clear or predictable as for for example the IEEE Control Systems Society in regards to future technical events, apart from the IFAC Congresses.

The Master Plan of IFAC Symposia

The TB spent considerable effort in the 1987-1990 triennium to form a reliable and predictable chart of the IFAC technical events. As a result a “Master Plan” was created for technical meetings. An “IFAC Symposium” is a technical meeting on a rather broad subfield of control that is part of a longer-term commitment: They should be arranged on a triennial schedule, and be planned well in advance. Ideally the sponsoring TC should meet at the Symposium and the next symposium in the series should ideally be announced with location and timing at the end of the previous one. A number of such symposia were put on the Master Plan list, and it was the task of the IFAC TB and the designated Technical Committee to make sure that long-range commitments to the control community on the event series were fulfilled. Other meetings on broader topics could still be arranged as “IFAC Conferences” but without a promise to be repeated. Meetings on more narrow topics were arranged as “IFAC Workshops”.

Despite the long-term view, the Master Plan list should of course be active: Symposium series can be abolished and be removed from the master plan if the interest in the topic declined, and conferences can be “upgraded” to symposia.

In the same spirit, guidelines for event organizers were gradually developed to insure that an IFAC event follows certain quality rules, so that potential attendees know what to expect.

The master plan has apparently served IFAC well and is regularly listed in various IFAC publications. It gives the control community insight in which meetings to expect. For certain subfields, the corresponding Symposium in the master plan is a key triennial event, to meet and have technical discussions, much like the IFAC Congress for the whole control community. For the Technical Committees, which are responsible for the symposium series, the planning and maintenance of the events become a backbone committee activity. Some symposium series have a very long and successful track record. An example is SYSID, the IFAC symposium on System Identification, which had its first meeting in Prague (1967), and continued triennially up to the 18th SYSID planned for Stockholm in 2018.

As an example of a typical annual calendar, the 2016 list of symposia is given here:

Advanced Control in Chemical Processes (ADCHEM)

Advances in Automotive Control (AAC)

Advances in Control Education (ACE)

Automatic Control in Aerospace (ACA)

Computer Applications in Biotechnology (CAB)

Computational Methods in Economics & Financial Systems (to be redeveloped)

Control in Transportation Systems (CTS)

Dynamics and Control of Process Systems (DYCOPS)

Fault Detection, Supervision and Safety for Technical Processes (SAFEPROCESS)

Human-Machine Systems (HMS)

Information Control in Manufacturing (INCOM)

Intelligent Autonomous Vehicles (IAV)

Large Scale (Complex) Systems (LSS)

Mechatronic Systems (MECHATRONIC)

Mining, Mineral and Metal Processing (MMM)

Modeling and Control of Biomedical Systems (to be redeveloped)

Non-Linear Control Systems (NOLCOS)

New name: Control of Power and Energy Systems (CPES) until 2012: Power Systems and Power Plants (PSPP)

Robot Control (SYROCO)

Robust Control Design (ROCOND)

System Identification (SYSYID)

System Structure and Control (SSC)

Telematics Applications (TA)

Cooperation with Other International Research Organizations Regarding Technical Events

IFAC has “sister federations” of similar structure and devoted to other neighboring fields: IFIP, IFORS, AICA and IMEKO. In the past they formed an informal group: FIACC - The Five International Associations Coordinating Committee. It was quite common that IFAC Technical events were co-organized or co-sponsored with sister organizations, like “the IFAC/IFIP Symposium on Digital Computer Applications in Process Control” (Stockholm, Sept 1964). IFAC still organizes such co-sponsored meetings, e.g.:“8th IFAC/IEEE/IFORS/ INFORMS Conference on Manufacturing Modeling, Management and Control” Troyes, France, June 2016. This co-operation is an asset and has not caused any problems.

Alongside IFAC there were other players in the control field that organized technical meetings. Some are very well established and of high standards, in particular the IEEE Conference on Decision and Control (CDC) and the American Control Conference (formerly known as the JACC). From IFAC's international point of view these can be considered “Regional Conferences” and are viewed as useful complements to the IFAC activities for the control community.

During the late 80s, voices were raised in Europe to create a European (or actually European Union) Control Conference (ECC). IFAC was not thrilled by the perspective of having (timing and topic) conflicts with a new player in the European arena. This issue was addressed and solved during Lennart Ljung's tenure. The idea was to join forces rather than to compete and fight. So IFAC decided to treat ECC the same as ACC, as a regional conference that would have IFAC’s support. The organizer of ACC is AACC (the American Automatic Control Council), which is the US NMO of IFAC. So it was rather natural to see ACC as a regional IFAC event. A similar arrangement was reached with ECC even though there was not an underlying IFAC NMO as host. So when the first European Control Conference was organized in Grenoble (1991), it had IFAC as an official technical co-sponsor, with liaisons from IFAC TCs among its IPC members

The same arrangement was made with the biennial Asian Control Conferences (ASCC), which first met in 1994. The Latin American Control Conference (LACC) is yet another ex-

ample. The latest addition, in 2015, to this list of IFAC affiliated conferences is FOSBE (Foundations of Systems Biology in Engineering).

The IFAC Newsletter lists ACC, ECC (now an annual event), the ASCC and the LACC in its "Calendar of IFAC events", and timing collisions are avoided through the co-sponsorship status. Conversely, these “regional meetings” list IFAC as a technical cosponsor in their promotional material. It may appear that the IFAC technical meeting activity is rather complex to the point that younger, less experienced conference organizers may have trouble following all the rules. In this section of the history we have not even mentioned the publications requirements for all IFAC events – all of which adds additional complications for a new organizer. In the later part of the 20th century, Mike Masten, TB chairman at that time, initiated an in-service training course and related publication guidance to help new conference organizers and TC chairs understand the IFAC style and rules for such conferences. These educational programs have become a regular feature of the IFAC Congresses that encourage new and often younger members of the profession to actively play leading roles in IFAC’s technical programs.

CHAPTER IV

PUBLICATIONS

IFAC's publication activities

The mission of IFAC is to develop and disseminate the science and application of automatic control. According to the IFAC Constitution, Article 3:

"IFAC is to promote the science and technology of automatic control and systems engineering ... by

Organizing and sponsoring technical meetings such as congresses, conferences, symposia and workshops

Technical publications

Any other means consistent with this Constitution."

The subject of this Chapter is "Technical publications". The most important such publications are technical journals and conference proceedings. In a broader sense, IFAC's publication activities comprise also various information brochures and bulletins, and an information website. This Chapter will describe how these activities have evolved from the first IFAC Congress and its Proceedings to the present situation of IFAC's seven technical journals and a centralized website, IFAC-PapersOnLine (POL), which serves as the official repository of Proceedings for all congresses, symposia and conferences. A key to the success of IFAC's publications has been a long-running collaborative arrangement with a leading commercial publisher, Elsevier Science (earlier Pergamon Press).

The major sources of information for the chapter are the minutes of the IFAC Executive Council (EC, later renamed as the Council) and of the IFAC-Elsevier Publications Managing Board, as well as annual reports of the publisher. The published recollections of two key figures, John Coales and George Axelby, provided a wealth of information about the early years. For the more mature period, Steve Kahne, and the author of this chapter, Janos Gertler (JG) have their own personal memories, while for the present, in particular concerning IFAC-PapersOnLine (POL), the reports of Juan Antonio de la Puente have provided guidance.

The two decades from 1957, when IFAC was formally established, to 1976, when the One-Publisher Agreement was signed with Pergamon Press, are considered the early years. Some of the minutes of the Executive Council meetings are missing for a number of years; therefore the information is detailed for some years and patchy for others.

Congress Preprints and Proceedings

The first publications of IFAC were the (Preprints and) Proceedings of the first IFAC Congress, taking place in Moscow in 1960. From the very beginning, there was a clear distinction between Preprints and Proceedings; initially prepared for the participants of the Congress, in paperback or even loose format, but later on professionally produced and meant for general sales.

The language situation was a source of significant complication at this and a few subsequent congresses. According to the Constitution, IFAC has four official languages, English, Russian, French, and German. Russian was particularly important, because the Soviet Union was recognized as an equal partner to the Western countries in IFAC. The use of Russian was also a practical necessity since the congress took place in Russia, with about half of the participants being local, and most had limited knowledge of English. Therefore, while papers could be submitted in any of the four languages, the Preprints were produced in two versions, English and Russian, with all English papers translated into Russian and vice versa (French and German papers remained in their original language). The Proceedings were also published in Russian and English, the Russian version edited by Academician Vadim Trapeznikov and published locally, while the English version, edited by Professor John Coales, was published by Butterworth in England.

Another source of difficulty was the inclusion in the Proceedings of the discussions that followed the presentation of the individual papers. While the discussions provide interesting material, their inclusion posed a major editorial task; their text had to be obtained from the discussers, in writing, and then translated into the appropriate language(s).

The traditions established in Moscow were followed at the second IFAC Congress, which took place in Basel (1963). Only 159 papers were accepted. The Preprints were prepared in two versions, English and Russian (with French and German papers also permitted). Since survey papers arrived late, they were provided as loose additions to the Preprints. The Editor of the Proceedings was Victor Broida. The English language Proceedings were then published again by Butterworth. (There is no information about the Proceedings in Russian.)

At the third Congress (London, 1966), the Preprints were organized into five volumes (according to the five parallel session-series) and each participant received only one as part of

the registration fee (others could be purchased in addition). There is no information about the handling of languages. The Institution of Mechanical Engineers (UK) published the Proceedings.

For the fourth Congress (Warsaw, 1969), papers were accepted in any of the four languages and were to appear in the Preprints in the original language, with an English translation also available. Abstract books were also prepared in all four languages. Discussions were taped but the organizers found it impossible to transcribe them. Proceedings, originally planned to be published by ISA, were abandoned, instead the set of Preprints was offered for sale, with an author and subject index in English and Russian.

For the fifth Congress (Paris, 1972) papers were only accepted in English. Discussions were planned to be included in the Proceedings but in a separate volume.

Symposium Preprints and Proceedings

The first IFAC Symposium took place in Rome (1962). Followed by another one in the same year in Moscow, three more in Dubrovnik, Stockholm, Stavanger (1964) and another three in Tokyo, Teddington, Munich (1965). It was agreed early on that no IFAC symposia would be organized in Congress years.

As a general rule, Preprints were provided to the symposium participants while Proceedings were made available after the symposium, for general sales. The Proceedings were supposed to contain, in addition to the symposium papers, a transcript of the discussions that followed the presentation of the individual papers and the materials of discussion sessions. To collect and transcribe the discussion materials required significant effort and was actually done only for a few of the early symposia and later abandoned altogether.

In some early symposium Preprints, papers appeared in a mixture of languages. This was definitely the case for the symposia taking place in the Soviet Union (Moscow, 1962), Yerevan, 1968 etc., where the papers of the local authors appeared in Russian. For the Proceedings, all papers were then translated into English. Some of the early symposia, including the one in Rome in 1962, had Proceedings in Russian as well.

For a period of time, French authors traveling to conferences on government support were expected (obliged?) to submit their papers in French. This was allowed under IFAC rules, French being one of the official languages. The papers then appeared in the Preprints in French (may have been translated into English for the Proceedings). The idea was to promote the French language but, in fact, this limited the exposure of French research to the broader professional community.

The Preprints were usually printed locally, in the country of the symposium. ISA (the Instrument Society of America) published the Proceedings (in English) for several early sym-

posia, using the material provided by the symposium organizers. This was the case with the Stockholm and Stavager symposia. IFAC then entered into a formal contract with ISA in 1965 for the publication of the Proceedings for IFAC Symposia. IFAC transferred the copyright of those materials to ISA. ISA was to take care of the translation costs, if any, and pay IFAC a 10% royalty. This path was still optional for the organizers; they could choose to publish and sell their own Proceedings. Publishing with ISA provided a standard quality, better marketing and visibility while publishing locally could serve as an additional source of income for the organizing NMO.

A perennial problem in IFAC, since its very early days, has been the situation with no-show authors. These were authors whose papers had been accepted for the symposium and included in the Preprints, but who then did not show up at the symposium. This created a significant disruption in the program and took away paper slots from other authors. Some people did this intentionally, to generate publications without attending the symposium. Most of the no-shows however were from the Soviet Union (and some other East-European countries), where individual researchers had very little control over their own attendance. Decisions on travel and participation were made on a bureaucratic-political level, considering the "political reliability" of the researcher and the allocation of the very scarce western funds. The western leaders of IFAC, especially those from the US, had little understanding of the situation and tended to blame the authors. As for the Proceedings, it was decided that the papers of the no-show authors should be removed from (not included in) the Proceedings. This may have been effective in weeding out those who tried to abuse this path for publication but had no effect on the bureaucrat who made the decisions in Moscow.

Automatica

This section heavily relies on the recollections of John Coales and George Axelby.

Coales, John, "*The Birth of IFAC and Its Publications*", Automatica, Vol. 19, pp. 329-335 (1983).

Axelby, George, "*IFAC Publications*", Automatica, Vol. 14, pp. 69-72 (1978).

Robert Maxwell, owner of Pergamon Press, initiated the creation of *Automatica* in 1961. Maxwell wanted it to be the official journal of IFAC but the majority of the IFAC leadership objected to this at that time. This is how John Coales remembers:

"In 1961, Bob Maxwell held a meeting at his premises in Fitzroy Square, to discuss the setting up of Automatica as the official journal of IFAC. There were ten of us including Hal Chestnut, and Don Eckman. Don Eckman opposed setting up the new journal but the others liked it, so Maxwell decided to go ahead without IFAC's official approval but with John Aseltine, Victor Broida, G.D.S. MacLellan and Henry Paynter [most also active in IFAC] as joint

editors. Thanks to them and to Hal Chestnut and Arnold Tustin who were co-chairmen of the Editorial Board it was almost immediately successful…"

The first issue of the journal came out with the publication date January-March 1963.

In parallel, there were discussions in the Executive Council about the idea of launching an IFAC journal but it was deemed premature by most.

The issue of *Automatica* becoming the official journal of IFAC was brought up again in 1963. After successful negotiations between Pergamon and IFAC, in which John Coales played a crucial role, an agreement was announced at the 1966 IFAC Congress in London. The first issue of IFAC Journal *Automatica* was published in January 1969. These are again the recollections of John:

"…soon after I became president in 1963 Bob Maxwell approached me with a view to Automatica becoming the official journal of IFAC. … I told Maxwell that in principle I had no objection and if he would set down his proposed heads of agreement, we would consider them. He immediately asked me to prepare the agreement implying that he would accept anything reasonable… At that time I did not feel that IFAC could expect a hand in the commercial management of the journal but must have full control of editorial matters. I therefore wrote into the agreement that there should be an editorial board of nine members, six nominated by IFAC and three by Pergamon. I felt that IFAC should have some financial reward so asked for 10% of the profits for IFAC…. Bob Maxwell readily agreed to these conditions and the draft agreement was approved by the Executive Council (EC) in London in 1966 and signed by both parties in 1967…"

Though professionally the journal was successful, it was not until 1977 that *Automatica* started to produce a profit. Pergamon covered the losses of the initial years (actually advances against future profits). Since then, the journal has been reliably profitable, and gradually became a significant source of income for IFAC.

Finding the right editor was critical to the success of the journal. Presumably at the suggestion of Harold Chestnut, George Axelby was approached in 1968 and offered the position. George at that time had been the Editor-in-Chief of the IEEE Transactions of Automatic Control; he was well known for his thoroughness, precision, devotion and integrity. George set some tough conditions and it took hard negotiations to convince him but finally he agreed to take the position. This is how he remembers:

"The Editor of the Journal was to be appointed by the Board, and in 1968 I was invited to take this position. To me, this was a great honor, but I did not accept the invitation until it was agreed that the following conditions would be met: (1) if it were to be the IFAC Journal, Automatica would have to be given the first rights to publish any paper presented at an IFAC

meeting, (2) all papers considered for possible publication would have to be reviewed and revised accordingly before they could be published, (3) editorial records would have to be maintained, publication schedules defined, and authors notified about the status of their papers, (4) no technical material could be published in the Journal without the consent of the Editor,…After it was formally agreed that these conditions would be met, an Editorial staff of Associate Editors with different interests from various parts of the world was organized, and papers were selected from 1968 IFAC Symposia for possible publication in the first issue of Automatica…"

The first issue of the "new" *Automatica* appeared in January 1969, followed by six issues every year. George Axelby served as Editor-in-Chief from 1968 through 1993. He made *Automatica* a world-class journal; his name became synonymous with *Automatica*.

Of George Axelby's conditions the primary access of *Automatica* to IFAC meeting papers has been the most significant. It was discussed and approved by the Executive Council (EC) in 1968 and reaffirmed several times in subsequent years. Conference organizers were required to include this stipulation in their Call for Papers. In its original form, the rule was too hard on authors; they were not allowed to submit their conference papers to any other journal, unless they obtained an explicit release from George. Later this was relaxed, giving *Automatica* three months after the conference to make their selection, and providing a blanket release after three months in case *Automatica* did not notify the author.

As an example of how the system worked, in 1975 *Automatica* selected 50 of the Boston Congress papers for consideration; how many of those made it through the strict reviewing procedure is not known. After the initial years, as direct submission of good quality papers picked up, the number of conference papers actually picked for consideration dwindled but the primary access rule remained in effect.

Automatica regularly published brief reports of IFAC symposia, provided by the organizers. There was a suggestion that Technical Committees (TC) should produce triennial activity (non-technical) reports for publication but this did not materialize.

IFAC Information Bulletin/Newsletter

As described by George Axelby (1978):

"It was recognized by the late President Victor Broida that publicity was needed for IFAC activities, and he initiated an IFAC Information Bulletin as soon as IFAC was officially created. The first Bulletin appeared in May 1958 and Professor Broida himself continued to collect information for these Bulletins through number 22, which was published in December 1965. These Bulletins were actually small booklets, averaging about 4 pages, and they contained information about automatic control meetings and publications throughout the world. Of

course, the task of assembling and producing these Bulletins was difficult and expensive. Consequently, the format and distribution of the Bulletin was changed: it was produced in a few pages format and distributed more often by the IFAC Secretariat in Dusseldorf, under the direction of Honorary Secretary G. Ruppel and Deputy Secretary L. Schroder. Under their guidance, the Bulletin was published from Number 23 through 89; the last one dated November 18, 1975. The title of the Bulletin was changed to IFAC Newsletter which was created and edited by M. Kummel."

IFAC Brochures

A set of five brochures was written to help authors to prepare and present their papers and for the organizers (National Member Organizations) to help organize symposia:

> Preparation of Slides – A Guide for Authors (1968)
>
> Presentation of Scientific Papers – A Guide for Authors and Session Chairmen (1970)
>
> Round-Table Discussions – Suggestions for Chairmen (1974)
>
> Information Guidelines for Organizers of IFAC Sponsored Symposia (provisional version, 1976)
>
> Information Guidelines for Symposium Editors (provisional version, 1976)

The first two Brochures were very useful, especially for young authors with little or no experience in preparing and presenting papers. The need for the other three arose from the fact that, with little exception, each symposium was organized by a new set of people, so there were very few really experienced organizers. These brochures were written by Jens Balchen, acting for the Advisory Committee of which he was a member at the time, Professor Verhagen, and mostly by Pieter Eykhoff, in his capacity as Honorary Editor.

Another kind of Brochure is the "*IFAC Information: Aims, Structure, Activities"* which has been re-published every three years and contains, beyond the items listed in the title, the list of office bearers for the triennium.

Multilingual Dictionary

A subcommittee of the IFAC Technical Committee on Terminology, under the leadership of David T. Broadbent, prepared a Multilingual Dictionary of Automatic Control Terms. This multi-year effort started in 1961 and completed in 1967, when the Dictionary was published by ISA (Instrument Society of America). The dictionary contains 878 control terms, in six languages (English, French, German, Russian, Italian and Spanish). The terms are grouped by technical subject areas, with an alphabetical index in each of the six languages. For a while adding definitions to each term (in English) was considered, but then this was abandoned.

IFAC Monographs

Professor Maciej Nalecz proposed the first IFAC Monograph in 1970, while he was serving as Chairman of the IFAC Components Committee. The Monograph was to be a collection of articles on various sub-areas within the general subject, in a pre-defined structure, written by authors invited by the volume editor. The monograph with the title *Trends in Control Components*, edited by Professor Nalecz, was completed in 1976 and published by the North-Holland Publishing Company.

The Executive Committee (EC) approved a second IFAC Monograph, on Systems Engineering, with Professor Andrzej Straszak as editor, in 1975.

Other Publications

IFAC Bibliography. The idea of an IFAC Bibliography, covering books and journal articles in the area of automatic control, came up as early as 1959 and was a project deemed very important by Victor Broida. It was clear from the beginning that a bibliography involved a major and continuing effort, requiring full-time staff and financial resources. After long discussions, the project was started in 1961, pretty much done by Broida alone, with some financial support secured from UNESCO. This bibliography covered only the immediate previous year and contained just titles and authors (no abstracts). There were plans to process the earlier years, at least back to 1950, but these were postponed. The last time the Bibliography is mentioned in EC material was in 1965, stating that the work should be continued, but apparently it was abandoned around that time.

IFAC Books. There were plans to produce educational materials in automatic control for technicians. An agreement was signed with McGraw-Hill in 1965 to publish these books, but in 1968 the project was dropped.

Publications Committee and Honorary Editors

In 1961, Don Eckman, who served as Chairman of the Advisory Committee, suggested that a comprehensive publications policy should be developed. The EC appointed an ad-hoc Publications Committee to do this and report back the following year. The committee consisted of John Coales, Victor Victor Broida, Gerhart Ruppel, and one member to be delegated by the USSR. The Committee reported in 1962 on the arrangements for the publication of the Basel Congress material and on suggestions to launch an IFAC journal. In the following year, it reported that the IFAC journal was still premature. It also defined its own task as formulating uniform and commercial ways to publish conference material, helping TC's on publication issues and making recommendations to the EC. At this point, the Publications Committee effectively became a permanent entity in the IFAC structure, reporting directly to the Executive Council (though there is no formal resolution to this end in the available EC materials).

The first Editors of IFAC were John Coales, serving as Editor for the English language Proceedings of the Moscow Congress and Victor Broida for the Basel Congress. The formal position of Honorary Editor was created to remedy the situation with Victor Broida, one of the founders of IFAC, who contributed significantly to the birth of the organization. According to the IFAC Constitution, nobody could be nominated IFAC President or Vice President, or even ordinary member of the Executive Council, without the consent of the National Member Organization in their country of citizenship – and Broida did not have the support of his French NMO. To circumvent this situation, the EC created the position of Honorary Editor, a position not mentioned in the Constitution and therefore not subject to NMO consent, and appointed Broida. In this capacity, Broida was responsible for the Bulletin and very active in the Bibliography effort. The position continued, later with two Honorary Editors, at least until 1976. Honorary Editors played a role in publication matters in general, and in the writing and revising the Guidelines brochures. Among others, Pieter Eykhoff and Steve Kahne served as Honorary Editors. (Broida then resolved his conflict with the NMO and went on to serve as IFAC President between 1969 and 1972, presiding over the Paris Congress.)

The Paper Age – 1976-1995

The signing of the One Publisher Agreement with Pergamon Press in 1976 marked the beginning of the second twenty years of IFAC's history. This agreement had a profound effect on the publication activities of the Federation.

The 20-year period of 1976-1995 was characterized worldwide by paper-based technology in publishing. Articles were submitted on paper, reviewing handled by back-and-forth mailing, Preprints and Proceedings produced on paper. This started to change with the San Francisco Congress (1996) – but that belongs to the history of the next 20 years.

An important development of the period was the launch of the second IFAC journal, *Control Engineering Practice*, in 1993.

The One Publisher Scheme

The introduction of the One Publisher Scheme has probably been the most important event, shaping the publication activities of IFAC during its 60 years of existence. According to John John Coales

"In 1974 Pieter Eykhoff proposed that it could be of great benefit to the control community if the proceedings of future IFAC meetings were published as a continuing single identifiable series. He also proposed that, if a suitable publisher could be found, this could be both profitable to IFAC financially and at the same time result in a reduction in the price of preprints, which would benefit the individual participants in the meetings. Pieter did an enormous amount of background work…"

The Minutes of the 1974 Executive Council meetings are not available, but in the 1975 Minutes there is reference to previous discussions. In 1975 (in Boston), Pieter Eykhoff presented the concept of the One Publisher Scheme. This was discussed, and Pieter was then charged with formulating a "Conclusion", which was endorsed by the Executive Council. This "Conclusion" not only provides the justification for the Scheme, but also contains a description of its desirable operation. Because of its significance, we include this Conclusion in its entirety.

> "CONCLUSION
>
> The IFAC Executive Council, during its meeting on August 22 & 23 (1975), agreed to the following:
>
> In view of the net advantages for the IFAC family and for the scientific community, a one-publisher scheme should be implemented.
>
> This one-publisher scheme implies that the Proceedings of all IFAC congresses, symposia (and where applicable conferences and workshops) will be published by one and the same publisher (the IFAC Publisher).
>
> All such publications are produced by way of author-prepared camera-ready copy and offset reproduction on a standard IFAC format to be chosen.
>
> The Preprints for such IFAC events may be printed:
>
> Either by the IFAC Publisher's printer or by a local printer.
>
> In both cases the standard IFAC format of the camera-ready copy has to be followed. The manuscripts have to be typed on preprinted sheets provided by the IFAC publisher.
>
> Based on considerations related to: worldwide sales promotion, quality of printing, reliability, prices quoted for preprints and proceedings, royalties and the relations with Automatica, the overall impression is that at this moment a suitable choice for IFAC Publisher is Pergamon Press.
>
> A Publications Committee is authorized:
>
> To select a publisher as IFAC publisher
>
> To start firm negotiations with this publisher
>
> To draft a contract (in which especially the translation rights are considered)
>
> To send this contract for signing to the IFAC President and Treasurer.
>
> This Committee consists of Messr. Axelby, Coales, Eykhoff, Kahne, Niemi, who will consult with the IFAC Treasurer.

The Publications Committee is asked to:

Layout procedures to be followed by the NMOs, e.g. Organizing Committees of symposia, etc. for consideration by the Policy Committee.

Consider the ways in which IFAC and the Organizing Committees may assist in stimulating a real worldwide distribution of Proceedings".

It is really remarkable how clearly the fundamental technical operation of the Scheme was seen already at this early time: author prepared manuscripts in standard format, from which both the Preprints and the Proceedings are produced, the Proceedings by the One Publisher and the preprints either by the One Publisher or by the conference organizers.

One argument against the proposed Scheme, that came up in the initial discussions and then several times in the following years, was that the conference organizers would lose the income they could have drawn from selling the Preprints after the conference (actually as Proceedings). The counter-argument was that they could save on the cost of the Preprints if ordered from one Publisher. This actually did not materialize, mainly because transportation expenses made the centrally produced Preprints more expensive than the locally produced ones. In the long run, however, the one-publisher scheme turned out to be a major source of income for IFAC, allowing a relative reduction of fees and a moderate increase of the membership fees the National Member Organizations had to pay.

According to the Minutes of the 1975 Executive Council meeting, ten publishers had been approached of which five showed interest in becoming the IFAC Publisher, ISA, North Holland, Pergamon Press, VDI-Verlag and Peter Pelegrinus. Of the five, ISA, Pergamon and Pelegrinus appeared to be favorable candidates. By the time the discussion ended and the Conclusion was written, "*the overall impression is [was] that at this moment a suitable choice for IFAC Publisher is Pergamon Press.*" An important factor in this preference was that *Automatica* was already published by Pergamon. Another factor may have been the good personal relations between John Coales and Bob Maxwell, the owner of Pergamon. Maxwell tended to support IFAC as a "Maecenas" of science and providing more favorable conditions than plain business considerations would have suggested.

Having settled on Pergamon, John Coales was entrusted with conducting the negotiations with Maxwell and preparing a legal agreement. This is how John remembers:

"During this period I had formed the opinion that, since IFAC publications would represent substantial business, about $200,000 a year, for the chosen publisher, it was in quite a different category from Automatica and IFAC should have a hand in its management and should receive a share of the profits as well as the royalties to which it would customarily be entitled. I felt this was important since it would stimulate the IFAC members of the Publication Board to take an active interest in the commercial success of the enterprise. I therefore suggested to Bob Maxwell that IFAC publications should be treated as a completely separate operation within Pergamon Press with its own Board of Directors on which IFAC would be properly represented. This would mean that it was effectively a fully paid up subsidiary of Pergamon Press with Pergamon providing the capital and IFAC the material to be published, which appeared to be an equitable arrangement. Bob Maxwell agreed with this and asked me to draw up a draft agreement for consideration."

The Agreement that arose from these negotiations, cloaked in legal language, contains the following important points:

The agreement covers any conference, symposium and congress organized by IFAC or any of its National Members but does not apply, if the Executive Council so decides, to conferences that are jointly organized by IFAC and any other body;

Pergamon is to publish the official bound volumes (Proceedings) and the pre-conference papers (Preprints);

Pergamon is not required to publish if the material is not in the agreed format;

Pergamon is to supply the National Members of IFAC with typing paper and instructions for the authors to prepare their manuscript;

Pergamon is to provide for the translation into English of any material as deemed desirable by the Managing Board;

Pergamon is to supply to IFAC, or any National Member, conference Preprints containing material supplied to Pergamon in the agreed format and in due time;

If a National Member desires that printing of the Preprints be carried out in its own country then Pergamon shall at its own expense arrange for this;

Financial arrangements should be negotiated between Pergamon and the National Member, with the Managing Board mediating if necessary;

IFAC will retain the copyright in all material appearing in the Preprints and Proceedings but Pergamon shall have a license for printing and publishing;

IFAC will on request provide any National Member free of charge permission to publish Proceedings or Preprints in any language other than English;

Pergamon shall keep separate accounts for the income and expenditures connected with the activities under this contract;

Pergamon is to pay, every year, into the Trust Fund ten per cent of the net receipts from the sale of publications under this contract;

In every year when the income exceeds the direct costs, Pergamon will pay into the Trust Fund ten per cent of the excess;

An IFAC Publications Trust Fund is to be set up;

The Trust Fund is managed by the Managing Board of Trustees;

The Managing Board may use the Trust Fund to support specific activities by the National Members and to cover travel expenses of the IFAC members of the Board to attend meetings of the Board. The excess money may be transferred to the account of IFAC;

Pergamon provides ten thousand dollars as an advance to the Trust Fund that may be repaid at a later time as decided by the Board;

A Managing Board is to be set up, consisting of a Chairman, nominated by Pergamon and approved by the Executive Council of IFAC, the IFAC President ex officio, and six other members, three each appointed by Pergamon and by IFAC;

The Chairman and the members are appointed for three years and their appointment may be renewed without term limits;

In the event of vote equality the Chairman has a second vote;

Pergamon shall appoint a Managing Editor for IFAC Publications;

The initial agreement was valid for five years, giving each party the possibility to cancel on an 18-month notice.

The Agreement was signed by the IFAC President, Uolevi Luoto, and Treasurer Michel Cuenod, on June 17, 1976. John Coales became the first Chairman of the Publications Managing Board (PUMB), by agreement between Pergamon and IFAC. Luoto appointed Pieter

Eykhoff, Janos Gertler and Steve Kahne as the three IFAC representatives. Eykhoff and Kahne were natural choices since they both had been Honorary Editors. Gertler was new to publications and his appointment was probably motivated by the intention of having somebody "from the East". Interestingly, Eykhoff, one of the main architects of the One Publisher Scheme, was only appointed after Luoto's original choice, Giorgio Quazza, declined. (Pieter then served on the Board for about 20 years. Gertler remained on the Board for 35 years and served as its Chairman from 1993 to 1999. Kahne went on to become IFAC President (1993-1996), and served as Chairman of the PUMB (1999 to 2011). Maxwell appointed himself and Gilbert Richards, who was Managing Editor of Pergamon, as well as Roy Strange, who also became Managing Editor for IFAC Publications.

The Managing Board was set up with the idea that situations could arise where the interests of IFAC and Pergamon may conflict, in which case the representatives of the two sides would represent opposing views. This never happened and the Board always reached its decisions by consensus. In later years, two of the Pergamon appointees were usually "IFAC people", former Presidents or other leading officers. There was one instance where the Agreement was not followed: prices were set by Pergamon rather than by the Board, with the Board at most asking questions and being given justifications. One item in particular occurred where the Board failed to deliver on the original promise of the scheme, namely that Pergamon did not offer Preprints to the conference organizers at "run-off cost" (just the cost of paper and printing).

Otherwise the scheme operated smoothly, pretty much according to the Agreement. The Pergamon "author's kits" became familiar fixtures at conferences, containing oversized typing mats with formatting lines, and author's instructions. The kits were sent by Pergamon in bulk to the conference organizers, or individually to the authors using mailing lists provided by the organizers. Pergamon provided the typing sheets free of charge, even if the Preprints were printed locally. The material was then sent to Pergamon for producing the Proceedings. Authors (or their secretaries) spent long hours typing the papers on those sheets using the typewriters of the days (IBM ball-head machines or just old Remingtons), trying not to make mistakes because those were quite hard to correct.

IFAC Proceedings

The Agreement covered the IFAC Congresses and all conferences/symposia where IFAC was the sole or primary sponsor. For these meetings, Preprints were required and Proceedings were to be published by Pergamon. In 1989, a formal distinction was introduced between symposia and conferences; symposia were subject meetings repeated every three years, according to a Master Plan prepared by the Technical Board, while Conferences were meetings outside the Master Plan. In addition, Workshops were defined as meetings with smaller at-

tendance and flexible arrangements; Preprints were not required and the publication of Proceedings was negotiated between the organizers and Pergamon.

The entire publication process was paper-based. The authors had to submit their draft papers, usually with three copies in A4/letter format, by mail. These were mailed out to reviewers, together with a Review Form, who then mailed back the completed forms. Authors of the accepted papers received Author's Kits, containing typing mats and instructions. The kits were provided by Pergamon, free of charge, and sent to the organizers in bulk for distribution or to the authors individually by Pergamon. The final papers had to be submitted by mail, typed on the special mats. Preprints were usually printed locally from the mats. These were then forwarded to Pergamon for producing the Proceedings.

The Proceedings were very elegantly produced, in silk-coated hard cover, the Symposium Series (containing also the Congress volumes) in red and the Workshop Series in blue.

The first conferences to which the Agreement applied were the ones in 1977. The first volumes appeared in 1978. Very soon, IFAC Publications became a rather sizable operation. The following table shows the number of volumes published in each year, together with the total number of pages, for 1982 through 1991.

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Symp. Vols.	9	11	10	7	10	14	16	11	17	6
WS. Vols.	2	4	5	1	8	7	0	9	10	0
Symp. Pages			5604	5899	4090	5798	5897	5154	7260	3800
WS. Pages			1190	150	1412	1508	0	1362	1650	0
Total Vols.	11	15	15	8	18	21	16	20	27	6
Total Pages	6072	6730	6794	6049	5502	7306	5897	5616	8910	3800

In accordance with the Agreement, conference organizers were not allowed to sell their Preprints outside the conference (unless Pergamon declined to publish Proceedings, as for some workshops).

It was felt in 1983 that the published material, in fact, was too much. Most of the material came from the symposia; the Technical Board controlled the number of symposia and the Agreement mandated publication for each of them. So the Managing Board felt that the only possibility was to reduce the size of the individual volumes by not publishing every symposium paper. To implement this policy, the position of Editor-in-Chief of the Symposium Se-

ries was created and Janos Gertler was appointed. Gertler worked with the symposium editors to make selections for the Proceedings; depending on the perceived quality of the material, 50% to 100% (on average about 70%) was selected. In 1988 a similar position was created for the Workshop Series (and Pieter Eykhoff appointed), with the primary task of deciding for which workshops Proceedings were to be published.

A perennial problem was that the Symposium Editors did not deliver the material for the Proceedings in time, or at all (some of them considered their task finished once the symposium was over). To deal with this situation, a per page honorarium was introduced for the Symposium Editors, that was gradually decreased in case of delayed delivery of the material.

Initially, the Proceedings business was quite an economic success. The volumes were selling well and the annual income significantly exceeded the production cost (though the latter was growing). This trend, however, changed in 1985: the income started to drop while the production cost steadily increased. From the trends it was predicted that the business would start losing money by 1990 or 1991. A detailed analysis was performed, using the expected total sales computed for each volume (estimated by fitting a saturating exponential function to the available data). The analysis showed a steady decline of the expected sales, from 600 to 300 copies, as a function of publication date. This was attributed to two factors: a contraction of the market (estimated from the data as 5% per year) and the effect of the increasing number of volumes published (libraries had a fixed budget to spend). While this was happening, the per unit production costs kept increasing, and Pergamon continued to produce basically the same number of copies of each volume for stock. These copies would never be sold and created additional storage costs. The numbers are shown in the table below.

Year	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Volumes	10	8	8	12	10	15	15	8	17	21	15
Avg. tot. sales	609	591	532	405	373	365	377	446	336	258	296
Avg. print run					600	540	519	491	526	507	530

Based on the results of this analysis, the Managing Board determined in 1992 that the Proceedings business was not sustainable in its existing form.

Starting with the conferences in 1994, Proceedings would not be produced for stock anymore, but printed in small batches on demand;

Alternatively Preprints may be bought from the conference organizers and sold as Proceedings;

The format of the Proceedings would be changed to soft cover;

For Congresses, full Proceedings would continue to be produced in hard cover.

After some experimentation, Pergamon settled with soft cover Proceedings produced in small batches for stock. These were published until the introduction of the web-based Proceedings site in 2008 and are sold even today. With this, the profitability of the Proceedings business was successfully restored.

Pergamon was purchased by Elsevier Science, Ltd. in 1991, but this did not affect the One Publisher Agreement. There is a certain irony in this since both North Holland and Pergamon Press were initial competitors for the IFAC contract and eventually Elsevier absorbed both of these publishers and continued on as the IFAC Publisher.

Automatica

Automatica was doing well, in terms of the quantity and quality of papers. In 1993 it went to 12 issues per year. Although its reputation as one of the leading journals in the field of automatic control was established, the number of subscriptions was not growing as expected.

The management structure of the journal changed in 1983. The former Editorial Board, which would set strategic directions for the journal, and supervise the Editor-in-Chief, was abolished and replaced by the Board of Editors, chaired by the Editor-in-Chief and consisting of the editors, plus a representative of Pergamon.

In 1991, Huibert Kwakernaak was appointed Deputy Editor-in-Chief. George Axelby retired in 1993, and was replaced by Kwakernaak.

Control Engineering Practice

The need for a second IFAC journal had been discussed for several years before its actual launch in January 1993. The decision to establish the journal was made in 1991. Specified to be different from *Automatica*, it was intended to carry papers on control applications and have at least half of its editors from industry. Mike Rodd was appointed as the new journal's Editor-in-Chief.

The original idea was that the journal would carry mostly selected conference papers, in their original form or revised. All papers would be reproduced from author provided camera-ready copies. This later changed as the journal became typeset. Also the original idea was for the abstracts of all conference papers to appear in the journal. This practice was abandoned after a couple of years for taking up too much space, and replaced with a list (titles and authors) of conference papers.

The new journal was soon technically successful and produced a financial surplus in a few years. Despite of initial fears, it never became competition to *Automatica*. (Perhaps it was no

accident that its launch coincided with the retirement of George Axelby). It enjoyed priority access to all IFAC conference materials, just like *Automatica* (without the priority order of the two journals ever being stated).

(Still back in 1987, Pergamon planned to launch a new journal on Artificial Intelligence and Expert Systems in Control, and offered it for consideration to IFAC. The Council showed an interest but George Axelby had serious reservations, so IFAC affiliation was taken off the table. The journal was launched anyway and later did become one of the IFAC journals.)

IFAC Affiliated Journals

The affiliated journal program was launched in 1991. The objective was to link IFAC Technical Committees with specialist journals. The arrangement promised to be mutually advantageous: the TC's and the conferences arranged by them would gain a publication outlet while the journal would gain a source of good material. The linking was to work particularly well if there were personal connections, even overlaps, between the TC and the Editor of the journal.

In reality, the program did not pick up as expected. The few journals offered by Pergamon for affiliation were poor matches for the TC's, and with some of the non-Pergamon journals suggested by some TC's, there was a lack of interest on the part of the journal editor or publisher. The situation improved when the effects of the acquisition by Elsevier reached down through the ranks, the pool of "in-house" journals became broader, but then the best affiliated journals soon became full-blown IFAC journals. This happened after 1995.

Monographs and Glossary

Two monographs were published during the 1976-1995 period:

• Trends and Progress in Systems Identification, Editor Pieter Eykhoff, 1981

• Control Aspects of Biomedical Engineering, Editor Maciej Nalecz, 1987

An additional monograph was proposed on Systems Engineering but never materialized. The two monographs were published by Pergamon as Volume 1 and 2 of the *IFAC Series for Graduates, Research Workers and Practicing Engineers*.

A new version of the IFAC Multilingual Glossary of Automatic Control Technology, Editors H.A. Prime and A. Work was also published by Pergamon, in two editions, in 1981 and 1995. The Glossary contained 1645 technical terms in eight languages, English, French, German, Russian, Italian, Spanish, Japanese and Chinese.

Brochures

The various information and instruction brochures were revised to reflect the changes according to the One Publisher Agreement. A new *Instruction Booklet to TC Chairs* (1986) and *Guidelines for Co-sponsorship* (1993) were produced.

In 1988, a new *IFAC Information* booklet was proposed and developed by Pieter Eykhoff, with a public relations flavor, primarily to attract more interest and participation from industry.

Newsletter

With the permanent IFAC Secretariat being set up at Laxenburg in 1979, the contents editing of the Newsletter was taken over by the Honorary Secretary Fred Margulies, and the technical editing by the secretarial staff.

In 1982, the Newsletter had two issues per year, 6 pages each; this was increased to six issues (6 pages) in 1983. From this time on, the Newsletter contained reports of the various IFAC events (earlier carried by *Automatica*).

The Electronic Age – 1996-2015

The past twenty years in publications have been characterized by the gradual replacement of paper-based procedures with “electronic” ones. In the conference organization and publications area this implied:

The introduction of web-based manuscript handling systems;

The use of CD-ROMs and later memory keys as the media for Preprints;

The establishment of a web-based Proceedings platform POL (PapersOnLine).

In the journal area, the number of IFAC journals increased from two to seven during this period, and all journals became available on a web-based platform, in addition to printed form. The affiliate journal program was phased out by the end of the period.

The gross income from publications in the most recent years amounted to about 60% of IFAC’s total income (the other 40% coming from membership fees), though lately a part of this income was used to pay for the operational expenses of POL.

Manuscript Management Systems

Starting with the San Francisco Congress in 1996, web-based systems were developed and used for the handling of conference manuscripts. These systems supported the submission of

draft manuscripts, management of the reviewing process (assigning/inviting reviewers, collecting reviews, making acceptance/rejection decisions by "associate editors" and providing feedback to authors), then the collection of the final papers and forming sessions. Initially there were no commercially available systems so, especially organizers of large meetings (for example, the Barcelona Congress in 2002), used in-house talent. Meanwhile, some of the smaller meetings continued to operate the old way.

In 2001, the Council set up a Task Force to study electronic conference management; they reported the following year that the transition to the new technology had basically taken place.

Pradeep Misra (a Professor of Electrical Engineering at Wright State University in the United States) developed a manuscript management system for the IEEE Control Systems Society, called PaperPlaza. Building on the success of the system, Pradeep founded a company, and started to market the manuscript management system worldwide under the name PaperCept.

The system integrated some elements of the PAMPUS paper handling system, developed for *Automatica* by Huibert Kwakernaak (who joined the company). PaperCept gained gradual acceptance in IFAC, as an increasing number of conference organizers chose to purchase and use it (including the Seoul Congress in 2008). PaperCept implements extensive manuscript handling functions in a flexible and user-friendly way. An additional, important feature of the system is checking the manuscripts for compliance with all formal requirements.

In 2012, on the recommendation of the Editor-in-Chief of IFAC-PapersOnLine (POL), the Council decided to make PaperCept the standard manuscript handling system for all IFAC congresses and symposia, and for conferences where IFAC is the main sponsor. The motivation was to provide formal uniformity and quality guarantees of all manuscripts, and seamless transfer of the material from the manuscript handling system to the publication platform. The organizers of the individual technical meetings are responsible for the expenses and have to contract with the supplier directly, while a framework agreement between IFAC and the PaperCept Company provides for preferential pricing for all IFAC events.

Preprints/Proceedings on CD-ROM

For the Congress in San Francisco (1996), the Preprints were still on paper (one plenary and 17 subject volumes) but, for the first time, Elsevier published the Proceedings both on paper and on a CD-ROM. The Congress in Beijing (1999) followed the same approach. In Barcelona (2002), the CD-ROM became the medium for the Congress Preprints.

In the early 2000's an increasing number of symposia and conferences adopted the CD-ROM as Preprint medium. Initially there was some hesitation in the Council; at the 2000 Council

meeting using the CD-ROM was encouraged while in 2002 hard copy was still recommended. The underlying issue was the availability of laptops to conference participants at the meeting. There were some intermediate solutions like having a printed volume of extended abstracts, in addition to the full material on the CD-ROM (2005 Council guidelines as minimum requirements). As an increasing fraction of the participants got used to carrying their laptops with them everywhere, the paper medium gradually disappeared from the conferences. More recently, newer memory technologies are replacing the CD-ROM, containing the full material of the conference.

IFAC-PapersOnLine (POL)

Following the decision to terminate the luxurious IFAC Proceedings series, Elsevier continued to publish and sell Postprint volumes. These were paperback Proceedings, produced in small batches. Between 1996 and 1999, 80 volumes were published with a total of 40,000 pages. Sales were limited but so were the production costs. The Postprint business continued to produce revenue but it became a minor part of the total IFAC-Elsevier portfolio (the majority of the income coming from journals). In 2004, Elsevier indicated it will cease to publish Postprints for workshops and that it may terminate the production of printed volumes completely. This was followed in 2005 by the announcement that the IFAC meeting Proceedings would be moved to a web-based platform.

The idea of a web-based publication of IFAC conference proceedings was suggested by Steve Kahne during the Buenos Aires (1989) council meetings, but then it was still premature. Later, in the mid-1990s, the Council set up a Task Force to study electronic publication schemes made possible by new storage and distribution methods. One of the observations was that the basic output of a conference was the individual technical paper rather than all the papers in a session or all the papers at the conference. Thus the goal was a method to distribute papers on demand. Of course the emergence of search engines make this possible.

The system, and ideas about its operation, evolved in several steps:

In 2006, Elsevier offered some details of the planned web-based system. Access would be free for individuals, and conference materials would be available at the time of the conference, thus making Preprints unnecessary. There would be a charge of 10 Euros per paper, to the conference organizers This charging philosophy was never implemented.

The basic concept of the system, now named IFAC-PapersOnLine (POL), was approved by the Council in 2007. The Council recognized that IFAC needed to contribute to the operating costs. The Council also insisted that all material placed on the platform must be previously peer-reviewed, based on full papers.

In 2008, Elsevier announced that they would pay for the cost of developing the system. IFAC would cover the operating cost, at least until 2010, then the conference organizers could be charged. POL was to be a self standing, open access, searchable and citable data base. Individual users need to register; they can download 25 papers per month free. Libraries and institutions will be charged a subscription fee. Using POL would become compulsory for all congresses and symposia, and for conferences where IFAC is the main sponsor. It is optional for workshops, for conferences co-sponsored by IFAC, and for regional conferences organized "in cooperation with IFAC". Juan A. de la Puente was appointed as Editor-in-Chief and would set up an Editorial Board. Eventually this Editorial Board would be strongly linked to the Technical Board

2009: POL already contained the material of 41 meetings, including the last 3 congresses and 20 symposia, 5 conferences and 11 workshops from the 2005-2008 period; a total of 10,500 papers. There were 5,000 registered users and a total of 28,000 downloads.

2010: 12,000 papers on the site, 7,000 registered users, and 50,000 downloads.

2011: There are problems with the quality of the material submitted for uploading by the meeting organizers (PDF formatting rules and restrictions are not observed). Also there is significant delay in some of the submissions. To deal with these problems, Council decided that there should be a single manuscript handling system mandatory for all meetings that use POL. Expenses should be borne by the meeting organizers. A Task Force, headed by Alberto Isidori, was set up to select the provider and draw up a framework agreement. It was also noted that indexing of papers on POL was not satisfactory; they were indexed by SCOPUS (Elsevier's indexing system) and by Google Scholar, but not by ISI.

2012: The Isidori Task Force, after careful consideration, recommended PaperCept as the general manuscript handling system. A framework agreement is signed with the PaperCept Company that guarantees preferential pricing for all IFAC events. Council makes the use of PaperCept mandatory for all meetings that use POL. Meeting organizers have to contract the PaperCept Company individually, within the framework agreement.

2014: The proceedings of all past IFAC technical meetings are to be scanned and uploaded into POL; IFAC is to cover the expenses. There had been some concern that the database for POL was more or less privately maintained and that it would be better to use a commercial and stable archive for POL. It was decided that Elsevier would move POL to the ScienceDirect platform (the home of Elsevier journals). This would ensure stability and take advantage of the reputation of Science Direct and its full access to all major indexing services.

Journals

Automatica is not *the* IFAC journal anymore but continues to be the flagship journal of IFAC, and one of two leading journals in the control field (the other being the *IEEE Transactions on Automatic Control*). In addition to its professional recognition, with the scaling back of the proceedings activities, *Automatica* had become the major source of income in the IFAC-Elsevier one-publisher scheme. In 2002, Huibert Kwakernaak, Editor-in-Chief, introduced the PAMPUS web-based manuscript handling system that he developed. In 2003, Kwakernaak retired and Tamer Basar took over as Editor-in-Chief. Basar then served in this capacity until 2015, at which point Roberto Tempo was selected to be EiC.

Control Engineering Practice was gradually building strength. 1997 was the first year the journal produced a profit. The same year, Elsevier changed the earlier camera-ready format to typesetting so that the journal could be included in ScienceDirect, the family of electronic journals. Also in 1997, Mike Rodd resigned as Editor-in-Chief and George Irwin took over, followed by A.H. Glattfelder, Ian Craig and Andreas Kugi.

Annual Reviews in Control became the third IFAC journal in 1997. It was the continuation of the old Pergamon journal Annual Reviews in Automatic Programming, with a redefined mission. The journal would primarily publish articles written, on invitation, on the basis of plenary lectures at recent IFAC conferences. It would also carry other papers, invited and unsolicited, of review nature. Janos Gertler was appointed Editor and served in this capacity until 2015, at which point Francoise Lamnabhi-Lagarrigue replaced him.

The Journal of Process Control and the Engineering Applications of Artificial Intelligence, two long standing Elsevier journals, became IFAC journals in 2001, after some period of operating as IFAC Affiliated journals. Mechatronics followed them in 2006. Finally, the journal Nonlinear Analysis: Hybrid Systems joined the family of IFAC journals in 2014.

As of 1997, all Elsevier journals went electronic, as part of the ScienceDirect platform. Printed versions were still continued. Subscriptions of electronic journals, especially ScienceDirect subscriptions by institutions, grew fast. In the year 2006, the six IFAC journals, all in ScienceDirect, had one million downloads. Also, all IFAC journals had reasonably high impact factors, growing over the years.

The Affiliated Journal Program received a boost when Pergamon was acquired by Elsevier Science because the pool of “in-house” journals grew significantly. Elsevier journals were affiliated within the framework of the One-Publisher Agreement. Some non-Elsevier journals were also affiliated directly with IFAC. Affiliated journals initially had to pay a GBP 25/paper levy; this was later changed to a flat fee of 300 Euros per year. In 1996, there were 5 affiliated journals plus one in process to be affiliated. In 2000 there were 8 affiliated journals of which 3 demonstrated excellent collaboration with the respective IFAC Technical Committee. The

Technical Board set the target of having at least one journal for each Coordinating Committee of IFAC.

The Affiliated Journal Program, however, had a rather bumpy history; several journals got de-affiliated a few years after affiliation, new ones got affiliated, etc. In several cases, the collaboration between the Technical Committees and editors was unsatisfactory, or ceased with the rotation of officers in IFAC. Finally, the Council decided to terminate the entire program in 2014. Successful affiliations were useful in that they provided additional outlets for IFAC conference papers, as was the original intention of the program. The main merit of the program was the preparation of a few journals, those where the connections to IFAC were strong and natural, for full IFAC journal status.

Starting with 2013, there were discussions between IFAC and Elsevier about launching *open access journals* or converting some of the existing ones into open access operation. However, Elsevier found the business environment for such journals very uncertain so decisions were postponed. Also there were plans on IFAC's side to launch a new open access electronic journal, the *Journal of Systems and Control*, to provide an outlet for some of the technical areas of IFAC not properly served by the existing journals.

Professional Briefs

The program of Professional Briefs was launched in 2000, to replace the earlier Monograph series. The idea was to create tutorial materials on important subjects in automatic control, not longer than 100-200 pages each. These were to be placed on the IFAC website as PDF files. In 2001, 8 proposals were accepted, of which 6 materialized. These are listed below and accessible online):

"Computer Control: An Overview" Björn Wittenmark, Karl Johan Åström, Karl-Erik Årzén

"Genetic algorithms in control systems engineering" Peter J. Fleming, Robin C. Purshouse

"Hands-on PID autotuning: A guide to better utilization" Alberto Leva, Chris Cox, Antonio Ruano

"Modelling of physical systems for the design and control of mechatronic systems" Job van Amerongen, Peter Breedveld

"Technologies for cost effective automation in manufacturing (Low cost automation)" Heinz-H. Erbe

"Sensor fusion" J.Z. Sasiadek

Milestone Reports

Milestone Reports are reports prepared by each Coordinating Committee (group of technical committees) describing the state of the art in their particular field. Milestone Reports were first prepared for the Barcelona Congress in 2002. The original intention was to have a new set of those reports for each congress but as time progressed it was found increasingly difficult to produce sufficiently new material. The Barcelona and the Prague Congresses (2002 and 2005) had full sets of 9 reports; the Prague set was republished in Annual Reviews of Control. For the later congresses, some of the Coordinating Committees produced no report at all, and of those that did, some were downgraded as simple survey papers.

IFAC 50

The volume Historic Control Textbooks, edited by Janos Gertler, was produced in 2006 for the 50th anniversary celebrations of IFAC. The volume contains material about 62 early control textbooks, from 21 countries in 20 languages. Each book is represented by a picture of its cover page, a short description, and the copy of a few pages containing figures or equations, recognizable by anybody familiar with control, without understanding the language. The cover page is a colored montage of 12 book-covers in as many languages. Elsevier published the volume. The IFAC Secretariat uses the book as a gift, among other things, for newly elected IFAC Fellows and for retiring officers.

Also for the 50th anniversary celebrations in 2006, a Control Resources project was launched. The aim was to collect control educational materials and web-based control experiments. The project was to be open ended. Initially, Ljubo Vlacic ran it until 2008 when it was taken over by the TC on Education, with new Editor-in-Chief Bozenna Pasik-Duncan. The material collected was placed on the IFAC website in 2011. Among other items, it contains a very extensive list of control textbooks.

Newsletter

The IFAC Newsletter is produced bimonthly for the purpose of disseminating current information relevant to IFAC. The IFAC Secretariat provides both content and format editing. For a long time, the Newsletter was available in printed as well as electronic form. Printing and, especially, mailing required significant expenditures. To reduce the cost, only the electronic version is provided on the IFAC website, since 2013. The website also contains an online archive dating back to the early 2000s.

Chapter V

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IFAC Leadership

1956 – 1957

Provisional Committee, Chair: Victor Broïda (FR)
Provisional Committee, Member: Otto Grebe (DE)
Provisional Committee, Member: Alexander M. Letov (SU)
Provisional Committee, Member: Paweł J. Nowacki, P. (PL)
Provisional Committee, Member: Rufus Oldenburger (US)
Provisional Committee, Member: Donald B. Welbourn (UK)
Provisional Committee, Secretary: Gerhart Ruppel (DE)

1957 – 1959

President: Harold Chestnut (US)
First Vice-President: Alexander M. Letov (SU)
Second Vice-President: Victor Broïda (FR)
Honorary Treasurer: Eduard Gerecke (CH)
Honorary Secretary: Gerhart Ruppel (DE)

1959 – 1961

President: Alexander M. Letov (SU)
Past President: Harold Chestnut (US)
First Vice-President: Eduard Gerecke (CH)
Second Vice-President: Otto Benedikt (HU)
Honorary Treasurer: Michel Cuénod (CH)
Honorary Secretary: Gerhart Ruppel (DE)

1961 – 1963

President: Eduard Gerecke (CH)
Past President: Alexander M. Letov (SU)
First Vice-President: John F. Coales (UK)
Second Vice-President: Paweł J. Nowacki (PL)
Honorary Treasurer: Michel Cuénod (CH)
Honorary Secretary: Gerhart Ruppel (DE)

1963 – 1966

President: John F. Coales (UK)

Past President: Eduard Gerecke (CH)

First Vice-President: Paweł J. Nowacki (PL)

Honorary Treasurer: Michel Cuénod (CH)

Honorary Secretary: Gerhart Ruppel (DE)

1966 – 1969

President: Paweł J. Nowacki (PL)

Past President: John F. Coales (UK)

First Vice-President: Victor Broïda (FR)

Second Vice-President: John C. Lozier (US)

Honorary Treasurer: Michel Cuénod (CH)

Honorary Secretary: Gerhart Ruppel (DE)

1969 – 1972

President: Victor Broïda (FR)

Past President: Paweł J. Nowacki (PL)

First Vice-President: John C. Lozier (US)

Second Vice-President: Jiří Beneš (CS)

Honorary Treasurer: Michel Cuénod (CH)

Honorary Secretary: Gerhart Ruppel (DE)

1972 – 1975

President: John C. Lozier (US)

Past President: Victor Broïda (FR)

First Vice-President: Uolevi A. Luoto (FI)

Second Vice-President: Yoshikazu Sawaragi (JP)

Honorary Treasurer: Michel Cuénod (CH)

Honorary Secretary: Mieczyslaw-Albert Kaaz (DE)

1975 – 1978

President: Uolevi A. Luoto (FI)

Past President: John C. Lozier (US)

First Vice-President: Yoshikazu Sawaragi (JP)

Second Vice-President: Tibor Vámos (HU)

Honorary Treasurer: Michel Cuénod (CH)

1978 – 1981

President: Yoshikazu Sawaragi (JP)

Past President: Uolevi A. Luoto (FI)

Vice-President TB: Tibor Vámos (HU)

Vice-President EB: Manfred Thoma (DE)

Honorary Treasurer: Michel Cuénod (CH)

Honorary Secretary: Fred Margulies (AT)

1981 – 1984

President: Tibor Vámos (HU)

Past President: Yoshikazu Sawaragi (JP)

President Elect: Manfred Thoma (DE)

Vice-President TB: Boris Tamm (SU)

Vice-President EB: William E. Miller (US)

Treasurer: Mohamed M. Mansour (CH)

Secretary: Fred Margulies (AT)

1984 – 1987

President: Manfred Thoma (DE)

Past President: Tibor Vámos (HU)

President Elect: Boris Tamm (SU)

Vice-President TB: Brian D.O. Anderson (AU)

Vice-President EB: William E. Miller (US)

Treasurer: Mohamed M. Mansour (CH)

Secretary: Gusztáv Hencsey (HU)

1987 – 1990

President: Boris Tamm (SU)

Past President: Manfred Thoma (DE)

President Elect: Brian D.O. Anderson (AU)

Vice-President TB: Lennart Ljung (SE)

Vice-President EB: Stephen J. Kahne (US)

Treasurer: Mohamed M. Mansour M. (CH)

Secretary: Gusztáv Hencsey (HU)

1990 – 1993

President: Brian D.O. Anderson (AU)

Past President: Boris Tamm (SU)

President Elect: Stephen J. Kahne (US)

Vice-President TB: Lennart Ljung (SE)

Vice-President EB: Yong-Zai Lu (CN)

Treasurer: Mohamed M. Mansour (CH)

Secretary: Gusztáv Hencsey (HU)

1993 – 1996

President: Stephen J. Kahne (US)

Past President: Brian D.O. Anderson (AU)

President Elect: Yong-Zai Lu (CN)

Vice-President TB: Vladimír Kučera (CZ)

Vice-President EB: Pedro Albertos Pérez (ES)

Treasurer: Walter Schaufelberger (CH)

Secretary: Gusztáv Hencsey (HU)

1996 – 1999

President: Yong-Zai Lu (CN)

Past President: Stephen J. Kahne (US)

President Elect: Pedro Albertos Pérez (ES)

Vice-President TB: Vladimír Kučera (CZ)

Vice-President EB: Rolf Isermann (DE)

Treasurer: Walter Schaufelberger (CH)

Secretary: Gusztáv Hencsey (HU)

1999 – 2002

President: Pedro Albertos Pérez (ES)

Past President: Yong-Zai Lu (CN)

President Elect: Vladimír Kučera (CZ)

Vice-President TB: Rolf Isermann (DE)

Vice-President EB: Wook Hyun Kwon (KR)

Treasurer: Walter Schaufelberger (CH)

Secretary: Gusztáv Hencsey (HU)

2002 – 2005

President: Vladimír Kučera (CZ)

Past President: Pedro Albertos Pérez (ES)

President Elect: Wook Hyun Kwon (KR)

Vice-President TB: Michael K. Masten (US)

Vice-President EB: Peter J. Fleming (UK)

Treasurer: Lino Guzzella (CH)

Secretary: Gusztáv Hencsey (HU)

2005 – 2008

President: Wook Hyun Kwon (KR)

Past President: Vladimír Kučera (CZ)

President Elect: Alberto Isidori A. (IT)

Vice-President TB: Sirkka-Liisa Jämsä-Jounela (FI)

Vice-President EB: Peter J. Fleming (UK)

Treasurer: Lino Guzzella (CH)

Secretary: Kurt Schlacher (AT)

2008 – 2011

President: Alberto Isidori A. (IT)

Past President: Wook Hyun Kwon (KR)

President Elect: Ian K. Craig (ZA)

Vice-President TB: Iven Y. Mareels (AU)

Vice-President EB: Roger M. Goodall (UK)

Treasurer: Lino Guzzella (CH)

Secretary: Kurt Schlacher (AT)

2011 – 2014

President: Ian K. Craig (ZA)

Past President: Alberto Isidori (IT)

President Elect: Janan Zaytoon (FR)

Vice-President TB: Iven Y. Mareels (AU)

Vice-President EB: Roger M. Goodall (UK)

Treasurer: Lino Guzzella (CH)

Secretary: Kurt Schlacher (AT)

2014 – 2017

President: Janan Zaytoon (FR)

Past President: Ian K. Craig (ZA)

President Elect: Frank Allgöwer (DE)

Vice-President TB: Frank J. Doyle (US)

Vice-President EB: Sergio Bittanti (IT)

Treasurer: John Lygeros (CH)

Secretary: Kurt Schlacher (AT)

President Biographies

A listing of all the IFAC presidents in chronological order

Harold Chestnut (US)

1st IFAC President 1957-1959

IFAC came into existence in 1957 under the leadership of its Executive Council and first President Harold Chestnut, distinguished engineer from the United States. Hal Chestnut was born on 25 November 1917 and died at the age of 83 on 29 August 2001 in Schenectady, NY. He earned BS and MS degrees in electrical engineering from MIT in 1939 and 1940 and received an Honorary Doctorate in engineering from Case Institute of Technology in 1966 and Villanova University in 1972. Hal began a life-long career in the control field with the General Electric Company in 1940 from which he retired in 1983. Major assignments included serving as manager of the Systems Engineering and Analysis Branch of the Advanced Technology Laboratory.

After his successful term as IFAC President from 1957 to 1959 Hal maintained an active role in IFAC. Although later Presidents came from the ranks of the most active IFAC leaders, Hal's role in IFAC started with the Presidency and his other IFAC leadership roles came later. He chaired the Advisory Committee, now called the Technical Board, from 1961 to 1966 and the Systems Engineering Technical Committee during 1966-1969. He served as Honorary Editor from 1969 to 1972 and was in the first group of Advisors appointed for life in 1984.

In 1961 Dr. Chestnut, outside his IFAC roles, served as co-chairman of the Honorary Editorial Advisory Board of a commercial control journal, whose full title was AUTOMATICA, The International Journal on Automatic Control and Automation. This journal was founded, owned and published by Pergamon Press in Oxford, under the leadership of its flamboyant chairman Robert Maxwell. Hal Chestnut (and John Coales, IFAC's fourth President) played a significant role in bringing Maxwell and IFAC together. The formal announcement that the journal and IFAC would join forces was made at the London IFAC Congress in 1966.

Dr. Chestnut continued with the General Electric Company until retirement in 1983. Although this note emphasizes Harold Chestnut's many contributions to IFAC and the technology it represents, his impact on the engineering profession is wider and more comprehensive than might be evident here. Before 1963 he chaired the AIEE Technical Committees on Automatic Control and on Systems, Man, and Cybernetics. After the AIEE and IRE merged in 1963 to form the IEEE, he had several major leadership roles in the IEEE culminating in his term as President of the IEEE in 1973. He was a Fellow of the AIEE, ISA, and AAAS. He was elected to the US National Academy of Engineering in 1974 and selected as a Case Centennial Scholar in 1980. He won the IEEE Centennial Medal in 1984 and the AACC Bellman Heritage Award in 1985. In 1998 Harold Chestnut and the Chestnut Family provided a gift to IFAC for the IFAC Textbook Prize. Income from this generous gift is used to fund the award for an outstanding textbook author recognized at each IFAC Congress.

Wikipedia: https://en.wikipedia.org/wiki/Harold_Chestnut

Archives: Conversations with the Elders - Harold Chestnut. Video recorded June 15th, 1990.

In memoriam—Harold Chestnut. IEEE the current source, Vol. 28, No. 1, April 2002.

Stephen Kahne, “Harold Chestnut, First IFAC President,” Automatica, June 2002, Volume 38, No. 6.

In memoriam - Harold Chestnut (1918-2001), in: Control Systems Magazine, IEEE, Vol. 22, No. 2, April 2002, pp. 87–87.

U. Luoto et al. „20 Years Old; 20 years Young“, Automatica, Vol. 14, pp. 49–75, 1978.

Harold Chestnut. IEEE Global History Network. IEEE. Retrieved 10 August 2011.

http://en.wikipedia.org/wiki/Harold_Chestnut

Archives:Conversations with the Elders - Harold Chestnut (Video)

Abstract: The Control Systems Society in Cooperation with the Georgia Institute of Technology presents Conversations with the Elders, a Series of Conversations with Distinguished Senior Control Engineers: Harold Chestnut. Recorded June 15th, 1990.

In memoriam—Harold Chestnut. IEEE the current source, Vol 28, no 1, April 2002

Stephen Kahne, Harold Chestnut, First IFAC President, in: Automatica, June 2002, Volume 38, No. 6

In memoriam - Harold Chestnut (1918-2001), in: Control Systems Magazine, IEEE, Volume 22, Issue 2, Apr 2002 pp 87–87

U. Luoto et al. "20 Years Old; 20 years Young", in AUTOMATICA, Vol. 14, pp 49–75, 1978

Harold Chestnut". IEEE Global History Network. IEEE. Retrieved 10 August 2011

Alexander M. Letov, Doctor of Sciences in Physics and Mathematics and a Corresponding Member of the U.S.S.R. Academy of Sciences, was born on 24 November 1911 and died before he was 63 on 29 September 1974, after a long and painful illness. Dr. Letov proved himself to be a talented researcher by making a valuable contribution to the development of inertial navigation.

The name of A. M. Letov is widely appraised by control engineers for his fundamental works on theory and methods of analytical design of automatic systems that were extensively used in the development of specific control systems for the iron and steel, chemical and other industries. His basic research in the stability of nonlinear control systems is universally recognized. The monograph “Stability of Nonlinear Control Systems” from his pen had to be republished in the U.S.S.R. and was translated into other languages. Besides being an eminent scientist, A. M. Letov was also an outstanding scientific administrator. He was Deputy Director of the Institute of Automation and Telemechanics in Moscow and President of the International Federation of Automatic Control (IFAC). He was also one of the pioneers of the International Institute for Applied Systems Analysis in Vienna. He helped with its early organization, and served as its first Deputy Director.

Dr. Letov was an untiring popularizer of science. His lectures and papers were heard in many centres of world science, and at international congresses and symposia. The scientific findings of A. M. Letov are kept alive and have been extended by his numerous followers.

Dr. Letov was a kind, gentle and warm human being. A man who enjoyed life, and made others around him feel a sense of brotherly comradeship. He had an electric presence, a youthful energy and enthusiasm that captured all of his colleagues. He believed, optimistically, in the future; he was a man of goodwill and he gave his ideas and his friendship with a full

heart. The charm of his personality will be long remembered by those who knew him well and worked beside him.

“In Memoriam: A.M. Letov.” Automatica, Vol. 11, No. 2, p. i., 1975.

The Great Soviet Encyclopedia, 3rd Edition (1970-1979) The Gale Group, Inc., 2010.

http://encyclopedia2.thefreedictionary.com/Letov,+Aleksandr

Alexander Mikhailovich Letov http://digitalcollections.library.cmu.edu/awweb/awarchive?type=file&item=54880

Kurdyukov, A.P.; Letova, T.; Vassilyev, S. N. „A.M. Letov: Life, Scientific Research, International Activity and Teaching Operation,“ In 9th IFAC Symposium Advances in Control Education, pp. 13-17, 2012.

Vassilyev, S.N.; Krasovskii, N.N.; Kurdyukov, A.P.; Kurzhanskii, A.B.; Letova, T.A. „Aleksandr Mikhailovich Letov (1911–1974)“. (English. Russian original). Autom. Remote Control 72, No. 11, 2221-2226 (2011); translation from Avtom. Telemekh. 2011, No. 11, 3-11 (2011). http://dx.doi.org/10.1134/S0005117911110014

Eduard Gerecke (CH)
3rd IFAC President 1961-1963

Prof. Dr.h.c. Gerecke was born on 28 May 1898 and left us on 28 April 1983, just one month before his 85th birthday. He finished his studies in 1922 at the Polytechnic Institute of Technology (ETH) of Zurich. For 30 years he was active in industry where he developed, along with other accomplishments, mercury arc rectifiers without pumps. In 1952 he became professor at the ETH, for electrotechnology, industrial electronics and automatic control. In 1956 he founded the Swiss Federation for Automatic Control. In the same year he also took part in the Congress of Heidelberg, where the creation of IFAC was planned.

In 1957 he attended the founding meeting of IFAC in Paris and became its first treasurer. The same year he also was appointed as vice-president of the International Federation for Analog Computing. In 1960, at the First IFAC Congress in Moscow, he was elected president of IFAC. In this capacity, he organized and chaired the Second IFAC Congress held in 1963 in Basel, which was a great success. He contributed considerably to creating the final organization and structure of IFAC. In 1962 he founded the Institut für Automatik und Industrielle Elektonik of the ETH.

Up to and during his retirement, he was involved in experimental and theoretical work on magnetism and on mathematical modeling of living systems. In recognition of his scientific work, he was honored with the title of Doctor Honoris Causa by the University of Darmstadt. Eduard Gerecke was an excellent pedagogue and he knew how to make complex theoretical relationships easily understandable. He was always trying to establish a link between theory and practice. One of his favorite sentences was “Nothing is more practical than a good theory”. He was a first-class organizer and called himself a "slave-driver". He knew how to delegate responsibility and put others to work. In fact he was an exceptionally efficient manager, and he knew how to make his aims an objective for his collaborators. But above all he was a friend for all those who worked with him, always encouraging and motivating his colleagues.

He has been an inspiring example for many generations of young engineers in the field of automatic control.

Obituary – Ed. Gerecke 1899 – 1983. Automatica, Vol. 20, No. 1, p. 1, 1984.

John F. Coales, CBE, FRS, FRSE, MA, Hon. D.Sc., C.Eng., FIEE, FIEEE, F.Inst.P., FICE, was born at Harborne in Birmingham on 14 September 1907 and died in Cambridge, England on 6 June 1999 in his 92nd year. He was educated at Berkhamsted School and Sussex College. In 1929 he joined the Admiralty at H. M. Signal School, Portsmouth to do original work on radio-direction finding, transferring in 1937 to ultra short-wave radar and communications. During the Second World War he was in charge of research and development on naval gunnery radar, for which he was awarded the O.B.E. in 1946. The same year he was appointed research director of Elliott Brothers, responsible for work on all aspects of instrumentation and automatic control. In 1952, Professor Coales returned to Cambridge University to organize research and post-graduate courses in control engineering. He was appointed assistant director of research in 1953 and rose to take a personal chair in 1965, when he also became one of the first Fellows of Clare Hall. In that year, the UK Science Research Council awarded John Coales' group a grant to set up a powerful combined analogue and digital computing installation to carry out long-term research on adaptive control of complex processes.

John F. Coales was one of the founder members of IFAC. He attended seminal meetings in the 1950s that led to the formation of IFAC; in 1957, he became member of the Executive Council. From 1961-63 he was first Vice-President. In 1963 he was elected President of IFAC for the 1963-66 triennium. The 3rd IFAC World Congress, which was prepared and took place under his Presidency in London in 1966, was a great success, but by no means marked the end of his IFAC activities. First serving as Past President and then member of the Advisory Committee, he was appointed lifetime Advisor of IFAC.

John F. Coales was instrumental in negotiating the unique publications agreement between Pergamon Press and IFAC in 1976, a one-publisher agreement that has proven so beneficial

to the Federation in subsequent years, and was Chairman of the Publications Managing Board for many years.

Professor John F. Coales was a remarkable gentleman, in the true sense of that word. He shall be remembered as a great scientist and inventor, as an educator but also as a warm-hearted man who was a pleasure to be with at all times.

Editorial, Automatica, January 2000, Volume 36, No. 1.

http://www.autsubmit.com/editorials/ed36_1.html

John Coales | News | The Guardian

http://www.theguardian.com/news/1999/jul/21/guardianobituaries2

John F. Coales: An Interview Conducted by William Aspray, Center for the History of Electrical Engineering, 21 March 1994.

http://ethw.org/Oral-History:John_Coales

Paweł J. Nowacki (25 June 1905 Berlin – 23 May 1979 Warsaw) was an engineer who worked for the British during World War II on radar installations, and later had a career as a university lecturer.

He attended secondary school in Berlin. From 1919 he lived in Poznań, where he received his high school diploma. He graduated in 1929 in Lwów with a degree in electrical engineering. While a junior student, he published his first book "Przerywacze elektryczne," B. Kotula, Cieszyn: 1924. In 1928 he was appointed assistant professor to Kazimierz Idaszewski. He earned his PhD in 1937. At the same time he directed various technical projects, such as the electrification of the Warsaw railway junction.

In 1940 he went to France and later to England. He had considerable achievements in development of radar equipment for the British military aviation. He was also a colonel of Royal Air Force authorized to military top secrets.

In 1947 he went to Wrocław to replace Professor Kazimierz Idaszewski in the position of Head of the Department of Electrical Machines. He inspired his colleagues and students to create a School of Electrical Engineering Science. In 1953 he moved permanently to Warsaw, to lead the Chair of Theoretical Electrical Engineering, and later the Department of Nuclear Energy. At the same time he worked in the automation field, and in biocybernetic issues.

The Royal Swedish Academy of Engineering Sciences appointed him as member in 1961. He was also a member of the Polish Academy of Sciences.

Paweł J. Nowacki was one of the founders of IFAC and the representative of the Polish NMO. He was elected IFAC President in 1966 and organized the 1969 IFAC World Congress in Warsaw.

Wikipedia: http://en.wikipedia.org/wiki/Jan_Pawe%C5%82_Nowacki

Curriculum Vitae (in Polish)

http://apw.ee.pw.edu.pl/tresc/sylw/nowacki/nowacki-zycior.htm

Victor Broïda (FR)
6th IFAC President 1969-1972

Professor Victor Broïda, internationally renowned specialist of automation and cybernetics and active initiator in the national and international professional life, was born in Moscow on 25 December 1907 and died in Paris on 28 November 1976. He studied at the Popov College in Moscow, then graduated as lngénieur at the Institut Electrotechnique de Grenoble in 1929. He worked on industrial heat exchangers for several years until in 1938 he was one of the first engineers in France to move into the field of Industrial Automatic Control. In 1944 he graduated as Ingénieur of the Conservatoire des Arts et Métiers and in 1947 he submitted his thesis to the Sorbonne and became a Docteur-lngénieur. From 1950 to 1958 he was Professor of Applied Thermodynamics at the Conservatoire National des Arts et Métiers in Paris, later being also Director of Advanced Studies in Industrial Automation. He was also from 1954 to 1956 Professor of Automatics in the Université du Travail de Charleroi (Belgium) and after that was a Visiting Professor in many Universities, notably those of Istanbul, Madrid, Barcelona, Buenos Aires, Santa Fé and Tucuman (Argentina).

He wrote two books and many papers. An identification method carries his name, and for his teaching he was made a Chevalier de la Légion d'Honneur in 1958.

Internationally he became renowned for his contributions to the scientific community. At the international conference of the VDI/VDE Fachgruppe for Automatic Control in Heidelberg, September 1956, 30 participants signed a declaration for the foundation of an international Federation for Automatic Control. On 12 September 1957, the first General Assembly of IFAC took place under the chairmanship of Professor Broïda. From 1969 until 1972 he was IFAC President, which included the responsibility for the 1972 IFAC Congress in Paris. Professor Broïda was for many years Honorary Editor of the IFAC Bulletin.

Concerning his other activities, he was a founder member and Vice-President of AFRA, from 1953 to 1959 he was President de l'Union des lngénieurs CNAM, from 1967 to 1970 Vice-President of FASFID (Fédération des Associations et Sociétés Françaises d'lngénieurs Diplômés) and from 1970 until 1973 President of the Coordinating Committee of the Five International Federations (FIACC). In 1973 he became Secretary-General of the Fédération Européenne des Associations Nationales d'Ingénieurs, which post he held until his death.

J.F. Coales, Obituary – Victor Broïda (1907 – 1976). Automatica, Vol. 13, pp. 455~456, 1977.

John C. Lozier received the A.B. degree from Columbia University in 1934 and attended graduate school at Princeton University prior to joining the Bell Telephone Laboratory (BTL) in 1936. He worked his entire career with the American Telephone and Telegraph Company's Bell Telephone Laboratory on a number of critical control tasks until retirement in 1977. During the earlier portion of this time, he was associated with such control pioneers as Nyquist and Bode. One of Lozier's early assignments was the control for acoustic homing torpedoes, which incorporated bang-bang controls as well as certain other nonlinear and adaptive control features. The control developed and demonstrated by Lozier and others was successfully tested before BTL and government officials in the Carribean. The torpedo using this control was used later in the North Atlantic.

Later, in the early 1950s, Lozier led a control systems team working on missile tracking radar for antiaircraft and antimissile defense systems. This work resulted in some fundamental discoveries relating the power and the error requirements of the system to the proper size and dynamic characteristics of the servo power elements and the control for the system. In the late 1950s and early 1960s, Lozier was responsible for the control of the Telstar ground-tracking antenna installed near Andover, Maine, and the Brittany Peninsula in France. This equipment, involving real-time computer control, enabled the first transatlantic TV operation in 1962. In recognition of this accomplishment, Lozier received the award of Chevalier of the Ordre du Mérite postal, France, 1962. In 1966, Lozier received the IEEE Fellow Award "for contributions in the field of automatic control and the use of digital computers in real-time control systems.

Lozier has contributed significantly to the development of automatic control as a recognized technical discipline and to the Institute of Radio Engineers Professional Group on Automatic

Control as a forerunner of the IEEE Control Systems Society. He has also served as President of the American Automatic Control Council, 1960-1962, and of the International Federation of Automatic Control, 1972-1975. It was during Lozier's IFAC presidency that the highly successful IFAC Congress was held in Boston in June 1975. He received numerous awards for his contribution to the field of control theory, including the Richard E. Bellman Control Heritage Award in 1987.

American automatic control council awards, IEEE Control Systems Magazine, August 1987, vol. 4, no. 7,p p. 47-48.

Wikipedia: http://en.wikipedia.org/wiki/John_C._Lozier

Uolevi Aarre Luoto (FI)
8th IFAC President 1975-1978

Mr. Uolevi A. Luoto was born on 19 October 1919 in Helsinki and passed away on 4 August 1993. He graduated as Dipl. Eng. from the Helsinki University of Technology (HUT) in 1945, visited the United States as Eisenhower exchange fellow, and in 1953 received the pre-doctoral degree of Licentiate of Technology from HUT.

In 1952 he became a Senior Research Officer at the Council for Scientific and Industrial Research in Pretoria, South Africa. He returned to Finland in 1956 to join the Industrial Instrumentation and Control division of EKONO Oy, Helsinki. In 1966 he became the managing director of Oy Finnatom Ab, Helsinki, where he stayed until re-joining EKONO Oy in 1975 as a chief consultant. He was appointed Vice-Manager in 1980 and retired in 1982.

Uolevi Luoto chaired the Finnish Nuclear Society from 1968-71. He was active in FORATOM, the European Group of Nuclear Industries and Utilities, becoming its President from 1979-80. He also chaired the Finnish Society of Automatic Control (FSAC) from 1957-1960, and was a member of the Working Group on Automation of the European Chemical Federation, becoming its Chairman from 1965-67.

Uolevi Luoto was appointed IFAC President for 1975-78. At the beginning of his presidency the IFAC secretariat moved from Düsseldorf to Helsinki and in 1978 was transferred to Austria, where it still is today. The one-publisher scheme of IFAC was established during this period. Mr. Luoto was the main host of the 7th IFAC World Congress in Helsinki, attended by 1000 participants from 38 countries. In 1981 he was appointed IFAC Adviser. He received the IFAC Outstanding Service Award in 1990 and a Medal of Merit from FSAC in 1993.

As appreciated professional and speaker of many languages, Uolevi Luoto was able to create close ties to a large number of colleagues from many countries and to harmonize their work in IFAC and in many international organizations. He was additionally active in the World

Environment and resources Council (governing board member), the Institution of mechanical Engineers UK (fellow), the IEEE/USA (senior member), and the American Nuclear Society.

Uolevi A. Luoto, 19 October 1919 – 4 August 1993, In Memoriam, IFAC Newsletter, No. 5, October, 1993.

Antti J Niemi, “Uolevi A. Luoto, suomalaisen säätötekniikan kansainvälinen yhdysmies”

in Teollisuusautomaation vuosikymmeniltä Osa 2 -vuoteen 1990,

Saarijärvi, Finland: Suomen Automaatioseura ry, 2003, s. 237-240.

Professor Sawaragi passed away at the age of 94 in Kyoto, Japan on 22 October 2011, where he was born on 19 December 1916. He made significant contributions in the fields of nonlinear forced vibrations, statistical analysis of nonlinear control systems, modern control theory and its applications, and system sciences with applications to environmental pollution control.

Yoshikazu Sawaragi graduated from the Department of Mechanical Engineering, Kyoto Imperial University in 1939, and joined the Faculty of Engineering, Nagoya Imperial University in 1941, and moved to the Faculty of Engineering, Kyoto University in 1947, and was promoted to full professor of the Faculty of Engineering, Kyoto University in 1950. Recognizing the importance of automatic control as a key technology in Japan, he organized a research committee of automatic control in the Faculty of Engineering, Kyoto University in 1952.

He also played a major role to launch a new Department of Applied Mathematics and Physics, Faculty of Engineering, Kyoto University in 1959 to educate students in new areas of applied mathematics, control theory, computer science, operations research, and applied physics. He has supervised a large number of doctoral students in Faculty of Engineering, Kyoto University.

Prof. Sawaragi was President of the Association of Automatic Control Engineers, Japan from 1971 to 1976 and from 1987 to 1989 served as President of the Society of Instrument of Control Engineers. In 1969 he became Member of Science Council of Japan, and was Chair of IFAC NMO Japan until 1981.

Professor Sawaragi attended the first international automatic control conference held in Heidelberg in 1956, as well as all the IFAC World Congresses until the 14th IFAC World Con-

gress in Beijing in 1999. He became IFAC president in 1978, and successfully organized the 8th IFAC World Congress in Kyoto 1981.

For his outstanding contributions to Systems and Control Engineering he received the Medal with Purple Ribbon in 1980, and the Second Class Order of Sacred Treasure in 1988, and Kyoto Prefecture Culture Achievement Award in 1994. He became an IFAC advisor in 1984, received the IFAC Outstanding Service Award in 1990, and became IFAC fellow in 2005.

Katayama, T., In Memory of Yoshikazu Sawaragi, IFAC Newsletter, No. 1, February, 2012.

Shenmu Yiyi, 椹木义一(卷名：自动控制与系统工程)Mulberry wood righteous one, Sawaragi Yoshikazu (1916 ~): http://kepu.ccut.edu.cn/100k/read-htm-tid-545.html

(English translation http://translate.google.cz/translate?hl=en&sl=zh-CN&u=http://kepu.ccut.edu.cn/100k/read-htm-tid-545.html&prev=search)

Tibor Vámos (HU)
10th IFAC President 1981-1984

Tibor Vámos was born on 26 June 1926 in Budapest, Hungary. He received the Diploma in Electrical Engineering, from Budapest Technical University in 1949, a PhD in Automatic Control and a DSc in Computer Control from the Hungarian Academy of Sciences in 1958 and 1964 respectively. He worked in the power industry as head of installations in Inota Plant (1950-52) and Dunaújváros Power Plant (1952-54). He joined the Computer and Automation Research Institute of the Hungarian Academy of Sciences in 1964, and has been a Professor at the Budapest Technical University since 1969. He was also a distinguished Affiliate Research Professor at George Mason University from 1993 to 1995.

Tibor Vámos was Director of the Computer and Automation Research Institute, Hungarian Academy of Sciences from 1964 to 1985 and has chaired the Board of the Institute since 1986. His main fields of interest have covered large-scale systems in process control; robot vision; pattern recognition; knowledge-based systems; knowledge representation and elicitation; and epistemic problems. He is the author, co-author, and co-editor of 7 books and more than 300 technical publications.

Prof. Vámos has been a member of the Hungarian Academy of Sciences since 1979; during 1985 – 1993, he served a Board Member of the Hungarian Academy of Sciences. He was the President of IFAC from 1981-1984 and was appointed IFAC Advisor in 1984. He is a Fellow of IFAC and the IEEE, was president of the John von Neumann Society from 1975-1985, and received an honorary doctorate in 1986 from Tallinn Technical University. He received the order of the Hungarian Republic in 1996.

Website: http://www.sztaki.hu/~vamos/
Wikipedia: https://hu.wikipedia.org/wiki/V%C3%A1mos_Tibor_(villamosm%C3%A9rn%C3%B6k)

Manfred Thoma (DE)
11th IFAC President 1984-1987

Manfred Thoma was born in Neumarkt in der Oberpfalz, Germany on 24 February 1929 and passed away in Hannover, Germany on 10 November 2014 at the age of 85 years. He received the Diplom Ingenieur Degree in Electrical Engineering and the Doktor Ingenieur Degree in Control Engineering in 1957 and 1963 respectively, both from the University of Darmstadt. After spending time at Purdue University he joined the University of Hannover in 1967 and remained there until his retirement in 1997. During this time he was a full Professor and Director of the Institut für Regelungstechnik, head of the Department of Electrical Engineering, Dean of the Engineering Faculty, and a Member of the Senate.

Manfred Thoma's research interest focused on applications of modern theory to real problems, mainly in the areas of stability, optimal and hierarchical control, control of systems with distributed parameters and their application in technical, chemical and biotechnological processes. With his comprehensive scientific expertise and his innovative ideas, he initiated a multitude of research and development projects and caused sustainable innovations. Thoma's research was often directly related to industrial problems and thus he was in close contact with industry throughout his career. This also manifested itself by having been elected as president of the INTERKAMA in Hannover for many years, one of the world's leading fairs for the process industry.

From 1984 to 1987, Prof. Thoma was IFAC President and under his leadership, the 10th IFAC World Congress took place in Munich, Germany, in 1987. He also served the German IFAC National Member Organization VDI/VDE. He organized the workshop series "Control Theory" at the Mathematisches Forschungsinstitut Oberwolfach, Germany. Furthermore, he is well known as past editor of a number of scientific book series published by Springer Ver-

lag, including Lecture Notes in Control and Information Sciences and Communications and Control Engineering.

Manfred Thoma received many awards, including the Ehrenzeichen of the VDI in 1985, the Computing and Control Division Premium of the IEE, and the IFAC Outstanding Service Award in 1990. He was appointed IFAC Advisor in 1990 and IFAC Fellow in 2005. He received honorary doctorates from the City University London, the Ruhr University Bochum, and the Helsinki University of Technology in 1991, 1992 and 1998 respectively.

Wikipedia: http://de.wikipedia.org/wiki/Manfred_Thoma

Frank Allgöwer, Obituary: Manfred Thoma1929–2014, IFAC Newsletter, No.1, February, 2015.

Boris Tamm (SU)
12th IFAC President 1987-1990

Boris Tamm was born on 23 June 1930 in Tallinn and passed away on 5 February 2002. He completed his studies in electrical power engineering in 1954 at Tallinn Technical University, obtained the Candidate of Sciences (PhD) in technical cybernetics from the Institute of Automatics and Telemechanics, Moscow in 1962, and in 1969 received the doctoral degree (DSc) in systems engineering from the Estonian Academy of Sciences.

Boris Tamm was the Director of the Institute of Cybernetics of the Estonian Academy of Sciences from 1969-1976 and from 1976-1990 served the Tallinn Technical University as Professor and Rector. From 1994 to 1999 he was the Vice-President of the Estonian Academy of Sciences and from 1991 to 1999 the Chairman of the Division of Informatics and Engineering. In 1991/1992 he was Visiting Research Professor at the University of Hannover. In 1995 he rejoined the Tallinn Technical University, and at the same time worked as senior research fellow at Cybernetica Ltd.

Boris Tamm was the author or co-author of over 100 scientific papers, chapters of books and proceedings and editor of several books in the field of programming, process modelling and control, and information processing. His early research interests were focused object-oriented programming languages and on compilation of computer-aided software engineering tools. Later, he studied human-machine operations, artificial intelligence, and expert systems.

He received many awards including the Estonian National Science Award (1966), the USSR Annual State Award on Science and Technology (1987), the IFAC Outstanding Service Award (1990, the Large Mente et Manu Medal of Tallinn Technical University (1992), and the Estonian 3rd class White Cross Order and the Estonian 3rd class Order of the White Star. He received honorary doctorates from the Budapest University of Technology (1982) and the Helsinki University of Technology (1988). He became a foreign member of the Finnish Acad-

emy of Technology in 1978 and of the Royal Swedish Academy of Engineering Sciences in 1990.

In 1987, Boris Tamm was elected IFAC President and organized the 11th IFAC World Congress in Tallinn in 1990, on the eve of the reconstitution of the Republic of Estonia. He was appointed IFAC Advisor in 1993.

Manfred Thoma and Rein Küttner, In Memoriam – Boris Tamm, obituary, IFAC Newletter, No.2, April 2002.

Rein Küttner, In Memoriam Boris Tamm, obituary, In: Proceedings of the Estonian Academy of Sciences, Engineering Mar 2002.

https://books.google.cz/books?id=beSXCNQJwYsC&pg=PA58&lpg=PA58&dq=IN+MEMORIAM+boris+tamm&source=bl&ots=Imggh1XPio&sig=SSPe-agNu5f-2BSstpMuwIOx1TU&hl=en&sa=X&ei=rUBkVbm1Fa-GGywPjs4KYAg&ved=0CEUQ6AEwBQ#v=onepage&q=IN%20MEMORIAM%20boris%20-tamm&f=false

Küberneetika Instituudi infoleht Nr.1/2002 (11): In memoriam – Boris Tamm (in Estonian).

http://www.ioc.ee/infoleht/2002_1/btamm.html

Brian D.O. Anderson was born on 15 January 1941, in Sydney, Australia and was educated at Sydney University in mathematics and electrical engineering, with PhD in electrical engineering from Stanford University in 1966.

Following graduation, he joined the faculty at Stanford University and worked at Vidar Corporation of Mountain View, California, as a staff consultant. He then returned to Australia to become a department chair in electrical engineering at the University of Newcastle. From there, he moved to the Australian National University in 1982, as the first engineering professor at that university. He retired as Distinguished Professor at the Australian National University in 2016, becoming an Emeritus Professor, and Distinguished Professor at Hangzhou Dianzi University.

During his period in academia, he spent significant time working for the Australian Government. This service included membership of the Prime Minister's Science Council, under the chairmanship of three prime ministers. He also served on advisory boards or boards of various companies, including the board of the world's major supplier of cochlear implants, Cochlear, where he was a director for ten years.

His awards include the IFAC Quazza Medal in 1999, IEEE Control Systems Award of 1997, the 2001 IEEE James H Mulligan, Jr Education Medal, and the Bode Prize of the IEEE Control System Society in 1992, as well as IEEE and other best paper prizes, including one from Automatica. He is a Fellow of the Australian Academy of Science, the Australian Academy of Technological Sciences and Engineering, the Royal Society (London), and a foreign member of the US National Academy of Engineering. He holds honorary doctorates from the Catholic University of Louvain in Belgium, the Swiss Federal Institute of Technology, Zurich, and the Universities of Sydney, Melbourne, New South Wales and Newcastle, together with the University of Technology, Sydney. He holds awards from the Australian and Japanese govern-

ments. As part of the 2016 Queen's Birthday honors, he was made a Companion of the Order of Australia, having been an Officer since 1993.

He served as IFAC President from 1990 to 1993, having had earlier periods in various IFAC roles, including Editor of Automatica. He was the main host of the 12th IFAC World Congress in Sydney, attended by 1250 participants. He was also President of the Australian Academy of Science from 1998 to 2002. His research interests have included circuits, signal processing and control, and his current work focuses on distributed control and econometric modeling. His publication list includes 9 books and over 1000 journal and conference papers.

Wikipedia: https://en.wikipedia.org/wiki/Brian_Anderson_(academic)

Engineering and Technology History Wiki: http://ethw.org/Brian_D.O._Anderson

Website: http://users.cecs.anu.edu.au/~briandoa/

Stephen J. Kahne, (US)
14th IFAC President 1993-1996

Stephen J. Kahne was born on April 5, 1937. He earned his BEE from Cornell University, and MS and PhD from the University of Illinois, all in electrical engineering in the early 1960s. He has had leadership roles in IFAC since the late 1960s leading to his election as President for the 1993-1996 triennium. He was instrumental in the creation and governance of the IFAC publications program for more than four decades. Following his term as IFAC President and host of the IFAC World Congress in San Francisco in 1996, he was appointed IFAC Advisor in 1999. He is the principle author of "The IFAC Story", a history of IFAC since its founding in 1957.

Dr. Kahne's technical work has been in systems engineering including optimization and control with applications to aerospace, aviation, industrial, military and social systems. His published work has appeared in various IEEE and IFAC journals and Scientific American.

In 2009 he retired, becoming Professor Emeritus of Engineering at Embry-Riddle Aeronautical University in Prescott, Arizona, USA where he previously held the position of Professor and Chancellor.

Professor Kahne has been a faculty member at the University of Minnesota, Minneapolis, MN, Case Western Reserve University, Cleveland, OH, Polytechnic Institute of New York University, Brooklyn, NY, Oregon Graduate Center, Portland, OR, and Embry-Riddle Aeronautical University, Prescott, AZ. He was Laboratory Director, Department Head, Dean, President and Chancellor at these institutions at various times during his career. In the 1960s and 1970s he helped found a multidisciplinary environmental design firm InterDesign in Minneapolis where, as Consulting Partner, he provided systems engineering support for numerous urban design projects. During the 1980s and 1990s he was Electrical and Computer Engineering Division Director at the US National Science Foundation and Group Chief Scientist at the MITRE Corporation and specialized in air traffic management.

Within the IEEE he was President of the Control Systems Society, Editor-in-Chief of the *Transactions on Automatic Control*, member of the IEEE Board of Directors, and IEEE Vice-President for Technical Activities. He is a Life Fellow of IEEE, and a Fellow of IFAC and the American Association for the Advancement of Science. In his local communities, Dr. Kahne has served on the governing boards of two non-profit hospitals and two mental health facilities. He is an active volunteer in regional agencies dealing with mental health, juvenile justice and child welfare. He also serves as a mediator in the Prescott justice court, and has been married to the Polish-born artist, Irena Nowacka Kahne, since 1970.

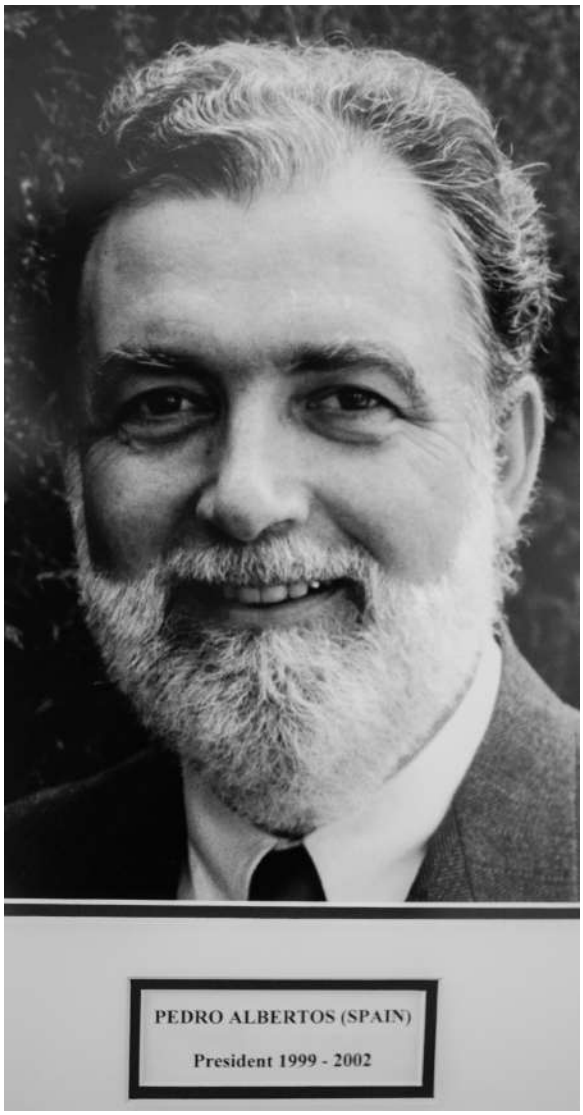
Yong-Zai Lu (CN)
15th IFAC President 1996-1999

Yong-Zai Lu received the Diploma Degree from the Department of Chemical Engineering at Zhejiang University, China in 1961 and was a visiting Research Associate Professor at Purdue University from 1980 to 1982.

From 1984–1992 he was a full Professor and Director of the Research Institute of Industrial Control at Zhejiang University. From 1991-2003 he held senior positions at Bethlehem Steel Co., i2 Technologies, Inc. and Pavilion Technologies, Inc., all in the US. From 2003–2007 he was Consulting Professor in the Department of Automation at Shanghai Jiaotong University, and from 2008 he is an Emeritus Professor at the Institute of Cyber-Systems and Control of Zhejiang University and Chief Scientist at the SUPCON Research Institute. His research interests are in the areas of systems modeling, control and optimization, computational intelligence, data mining and knowledge discovery, and supply chain management and production scheduling.

Besides being President of IFAC from 1996-1999, Prof. Lu was also Vice President of Chinese Association of Automation from 1991-1999, and a Member of Automatic Control Division, NSF, China from 1984-1991. He has received many awards including the UOP Technology Award of the ISA in 1989, the Kelly Award of the AISE in 1995 and 1996, the IFAC Outstanding Service Award in 1996, National Science and Technology Awards (2nd Place) in China in 1988 and 1993, Best Scientific and Technology Book Award (1st Place) in China in 1988 and was elected IEEE Fellow in 1998.

He has authored and co-authored five automatic control and optimization monograph and textbooks, and numerous scientific papers in the world. As a professor and scientist he has supervised more than 80 PhD and MS candidates in both Zhejiang University and Shanghai Jiao Tong University in China.



Pedro Albertos was born in Valencia, Spain, in 1943. He obtained the MsC degree in 1968 and the PhD in 1973, at the Universidad Politécnica de Madrid. He started his academic activity at this university as an associated professor in Control Engineering in 1968. He then was appointed a full professor in Electrical Engineering at the Technical School of Linares (Jaen), becoming full professor at the High School of Engineering in Bilbao, Basque Country University in 1975. In 1977 he moved to the Systems Engineering and Control Department of the Universidad Politécnica de Valencia (UPV) in Spain, where he has been active in the last 40 years, being head of the department as well as coordinator of PhD and MsC studies. He is currently Emeritus Professor at this department.

Pedro Albertos is the author of over 300 papers, book chapters and congress communications, co-editor of 7 books and co-author of "Multivariable Control Systems" (Springer 2004) and "Feedback and Control for Everyone" (Springer 2010), as well as several teaching books in Spanish. He was an Associate Editor of Automatica, being currently an Associate Editor of Control Engineering Practice and Editor-in-Chief of the Spanish journal RIAI. His current research interests include multivariable control and non-conventional sampling control systems with a focus on time delays and multi-rate sampling patterns. He has been an invited Professor at more than 20 universities, and delivered plenary talks at several international conferences.

His teaching activity has been recognized as excellent in the UPV and, recently, he has launched a successful Massive Online Open Course on Dynamics and Control.

As Chair of the Spanish Control Association (CEA) (1990-2001) Pedro Albertos led it to the highest international standard, becoming the organizer of the XV IFAC World Congress in Barcelona. He was involved in IFAC since 1984 (TC on Components), being appointed as Vice president in 1993-1996, President elect in 1996-1999 and IFAC President in the period 1999-2002. In the period 2005-2014 he was leading the IFAC Foundation. In 2005 he was appointed an IFAC Advisor and was elected IFAC Fellow in 2006. Pedro Albertos was a member of the Board of Governors of the Control Systems Society of IEEE, and is a Life Senior Member of this association.

He is an Honorary Professor at the North-Eastern University, Shenyang, China and holds honorary doctorates from the Universities of Oulu (Finland) and the Polytechnic of Bucharest (Romania), receiving several awards from the Spanish Government and the UPV.

Website: http://www.mooc-list.com/instructor/pedro-albertos

Vladimír Kučera (CZ)
17th IFAC President 2002-2005

Vladimír Kučera was born in Prague, Czechoslovakia in 1943, and studied at the Czech Technical University in Prague, where he obtained a degree in Electrical Engineering in 1966. He then received the CSc. and DrSc.-research degrees in Control Engineering from the Czechoslovak Academy of Sciences in 1970 and 1979, respectively.

Since 1967, Vladimír Kučera has been a member of the Institute of Information Theory and Automation of the Academy of Sciences in Prague, of which he later became the Director (1990-1998). He was associated with the Czech Technical University in Prague since 1997, and Head of Control Engineering Department (1999-2000), Dean of the Faculty of Electrical Engineering (2000-2006), and Director of the Masaryk Institute of Advanced Studies (2007-2015); he is currently a Distinguished Researcher and Vice-Director of the Czech Institute of Informatics, Robotics, and Cybernetics.

Vladimír Kučera held many visiting positions, including those at the National Research Council, Ottawa, Canada in 1970-1971; University of Florida, Gainesville, USA in 1977; Ecole Nationale Supérieure de Mécanique, Nantes, France in 1981-1982; Australian National University, Canberra, Australia in 1984; Uppsala Universitet, Sweden in 1989; CINVESTAV del IPN, Mexico City in 1991; ETH Zürich, Switzerland in 1992; University of Newcastle, Australia in 1993; Politecnico di Milano, Italy in 1995, as well as a number of short visiting appointments. He was Nippon Steel Professor at the Chair of Intelligent Control, Tokyo Institute of Technology, and Japan in 1994.

He is well known for his contributions to the theory of Riccati equations and linear-quadratic control. He pioneered the use of polynomial equations in the design of control systems. His most famous result is the parameterization of all controllers that stabilize a given plant, known as the Youla-Kučera parameterization. He is the author of four books, including “Dis-

crete Linear Control: The Polynomial Equation Approach" (Wiley 1979), and 300 research papers.

Vladimír Kučera is a Fellow of IEEE (1996) and an IFAC Fellow (2007). He is a founding member and Fellow of the Engineering Academy of the Czech Republic, and past Chairman (1993 – 2002) of the Czech Committee for Automatic Control, the Czech NMO of IFAC. He was IFAC President in the 2002-2005 triennium. The 16th IFAC World Congress, which took place during his Presidency, was IFAC's biggest in number of attendees. He was appointed Advisor in 2008, following 21 years of service on the Council.

Vladimír Kučera received many prizes including the Automatica Prize Paper Award (1990), the Hlávka Foundation Prize (1992), the IFAC Outstanding Service Award (1996), and was appointed Chevalier dans l'ordre des Palmes Académiques by the French Government (2006). He is an Honorary Professor at the Northeastern University, Shenyang, China (1996) and received honorary doctorates from the Université Paul Sabatier, Toulouse (2003) and the Université Henri Poincaré, Nancy (2005).

Website: http://people.ciirc.cvut.cz/kucera

Wook H. Kwon (KR)
18th IFAC President 2005-2008

Wook Hyun Kwon graduated with a B.Sc. and M.Sc. in Electrical Engineering from Seoul National University, Seoul, Korea in 1966 and 1972 respectively. He was awarded a Ph.D. in control from Brown University in 1975. From 1975 to 1976 he was a research associate at Brown University and from 1976 to 1977 an adjunct assistant professor at the University of Iowa. He has been with Seoul National University since 1977, where he is currently a Professor Emeritus at the School of Electrical and Computer Engineering since 2008. He was a visiting assistant professor at Stanford University in 1981-1982. He was a chaired professor at the DGIST (Daegu Gyeongbuk Institute of Science and Technology) in 2010-2014.

Dr. Kwon has published about 150 journal papers and approximately 260 conference papers, mostly in the areas of predictive controls, time-delayed system, FIR filtering, and real-time computer applications for automation. He authored a graduate textbook, "Receding Horizon Control: Model Predictive Control for State Models", which appeared in July, 2005 by Springer. He supervised about 130 graduate students including 55 Ph.D students. From his encouragement of entrepreneurship, some of his graduate students founded about 10 start-up companies including Humax, seven of which have already gone public in KOSTAQ.

He became a Fellow of the National Academy of Engineering of Korea (NAEK) in 1995, a Fellow of the Korean Academy of Sciences and Technology (KAST) in 1996, a Fellow of IEEE in 1999, a Fellow of TWAS (The World Academy of Sciences for the Developing Countries) in 2001, and a Fellow of IFAC (International Federation of Automatic Control) in 2010. He received Korean Academy of Science (KAS) Award in 1997, Brown University Engineering Alumni Medal (BEAM) Award in 2003, and the Korea Highest Scientist/Engineer Award (cash prize, 300,000 USD) of Ministry of Science and Technology in 2007.

He was President of the Institute of Control, Robotics and Systems Engineers (ICROS) of Korea in 1999, President of the Korean Institute of Electrical Engineers (KIEE) in 2001, Vice-President of the National Academy of Engineering of Korea (NAEK) in 2002-2006, President of the International Federation of Automatic Control (IFAC) in 2005-2008, and. Vice-President of the Korean Academy of Science and Technology (KAST) in 2007-2010. He was a Trustee of POSTECH in 2007-2015 and a member of the Board of LS Group from 2005-2017.

He was President of IFAC for the triennium 2005–2008, and organized a very successful IFAC World Congress in Seoul, 2008, which was selected by Seoul Metropolitan Government as the best convention among all those held in Seoul in 2007-2008 and thus received the 2009 Seoul Tourism Award. In 2007, he donated a major gift of 500,000 USD to the IFAC Foundation to foster the scientific and social goals of IFAC, including support to the control community in developing countries.

Website: http://whkwon.dgist.ac.kr/HOME/whkwon/main/main.htm

Website: http://kwonlecture.snu.ac.kr/about

Alberto Isidori (IT)
19th IFAC President 2008-2011

Alberto Isidori was born in Rapallo, Italy, in 1942. He graduated in electrical engineering from the University of Rome in 1965, where he earned also his PhD degree in 1969. Between 1975 and 2012, he has been Professor of automatic control at the University of Rome "Sapienza", where he is currently Professor Emeritus. From 1989 to 2006 he was an Affiliate Professor (on a half-time basis) at the Department of Systems Science and Mathematics, of Washington University, St. Louis, Missouri. He has held visiting positions at various academic/research institutions which include the University of Florida, Gainesville in 1974, the University of California, Davis in 1983, Arizona State University, Tempe in 1986, the University of Illinois, Urbana-Champaign in 1987, the CINVESTAV, Mexico City in 1987, the University of California, Berkeley in 1988, the ETH, Zurich in 1991, Université Paris-Dauphine, Paris in 1992, the NASA Langley research center in 1996, the Mittag-Leffler Institute, Stockholm in 2003, and Zhejiang University, Hangzhou from 2013 to 2016.

His research interests are primarily focused on mathematical control theory and nonlinear control systems design. He developed the "nonlinear analogue" of the notion of "zero" of a transfer function, and studied the problems of regulation, disturbance attenuation and robust stabilization of nonlinear systems. He authored the highly cited book "Nonlinear Control Systems". He was elected IEEE Fellow in 1986 and IFAC Fellow in 2005. He received the Axelby Outstanding Paper Award in 1981 and 1990, the Automatica Best Paper Award in 1991 and 2005, the Quazza Medal of IFAC in 1996, the Ktesibios Award of the Mediterranean Control Association in 2000, the CSS Bode Lecture Prize in 2001, and the IEEE Control Systems Award in 2012. He received an honorary doctorate from KTH of Sweden in 2009, and the Galileo Award from the Rotary Clubs of Italy in 2009. In 2012 he was elected corresponding member of the Accademia Nazionale dei Lincei.

He was President of the European Union Control Association (EUCA) between 1995 and 1997. During 2008 – 2011 he was President of IFAC. The 18th IFAC World Congress, which was prepared and took place under his Presidency in Milan in 2011, was a great success. In 2014, he was appointed IFAC Advisor and Chair of the IFAC Foundation Board of Trustees.

Wikipedia: https://en.wikipedia.org/wiki/Alberto_Isidori

Website: http://www.dis.uniroma1.it/~isidori/

Website: http://www.ese.wustl.edu/faculty/Isidori/isidori.html

Ian Keith Craig was born in Potchefstroom, South Africa on 28 June 1961. He matriculated from the Menlopark High School in Pretoria, South Africa in 1979. After two years of compulsory national service in the South African Navy, Ian Craig went to study electronic engineering at the University of Pretoria from which he received the B.Eng. degree in 1985, and was awarded the prize for 'Best Student in Electronic Engineering'.

Ian Craig joined the Measurement and Control Division of Mintek as an engineer-in-training in 1986. He was granted a two-year leave of absence (1987-1989) from Mintek, who sponsored him to complete the S.M. degree at the Massachusetts Institute of Technology, Cambridge, USA, which he received in 1989.

Upon his return to South Africa in 1989, Ian Craig resumed his duties at Mintek where he was involved in the design, implementation and commercialization of advanced controllers for the mineral processing industry. Alongside his work, Ian Craig studied part-time and received the Ph.D (1993) and M.B.A. (1996) degrees from the University of the Witwatersrand, Johannesburg, South Africa. He progressed to the level of Group Leader at Mintek, before becoming Professor and Section Head: Control Systems in the Department of Electrical, Electronic and Computer Engineering at the University of Pretoria in 1995 – a position he still holds.

His research interests include the modeling and control of process systems, with particular focus on mineral and metal processing and utilities in the process industries; the economic performance assessment of process control and automation; and the modeling and control of disease networks.

Professor Craig was Editor-in-Chief of the journal Control Engineering Practice from 2005-2010. He was President of the International Federation of Automatic Control (IFAC) from 2011-2014. The 19th IFAC World Congress, which took place under his Presidency in Cape Town in 2014, was the first IFAC congress ever held in Africa. During his presidency Professor Craig initiated a strategic planning exercise that resulted in many initiatives, including the rebranding of IFAC and all of its publication outlets, and the moving of IFAC-PapersOnLine (POL) to the ScienceDirect platform.

Professor Craig received the IFAC outstanding service award in 2008 and is a fellow of the South African Academy of Engineering and a registered Professional Engineer in South Africa. He has thrice received the exceptional academic achiever award from the University of Pretoria, and in 2014 he received the President's Award from the South African Institute of Electrical Engineers. He was President of the South African Council for Automation and Control (SACAC), the IFAC National Member Organization, from 1997 to 1999.

Website: http://www.up.ac.za/eece/article/1952234/prof-ik-craig-ian

Janan Zaytoon (FR)
21st IFAC President 2014-2017

Born in 1962, Janan Zaytoon (BSc Eng./1983, MSc Eng./1986, DEA/1988, PhD/1993, Habilitation/1997) is a Professor at the University of Reims Champagne-Ardenne. He was the founding Director of the CReSTIC Research Centre (involving 140 researchers) of the University. He was the Past Director of the French national research network/group "GDR MACS of CNRS", which involves 2500 researchers and engineers in the fields of Automatic Control and Production systems. He is the Chair of the French National Member organization of IFAC. His work involves theoretical, methodological and applied aspects of automatic control systems, mainly in the areas of discrete-event systems, hybrid systems, and intelligent control. He published and edited 52 books, conference proceedings and special journal issues. He also published 60 journal papers, 126 conference papers, and holds 6 patents. He was the advisor of 18 PhD students and 5 "habilitations".

Janan Zaytoon was the founding Editor-in-Chief of the IFAC Journal Nonlinear Analysis: Hybrid Systems. He is an Associate Editor of Control Engineering Practice and Discrete Event Dynamic Systems. He served as Chair/Co-Chair of 15 international conferences and 12 national conferences, and was the founder of the IFAC Conference series on Analysis and Design of Hybrid Systems. He Chaired the IFAC Technical Committee on Discrete-Event and Hybrid Systems, and received the IFAC Outstanding Service Award and the 2014 Paper Prize of the Journal of Engineering Applications of Artificial Intelligence. He has been invited plenary speaker for 8 international conferences, and invited visitor to 10 universities. He has also chaired the scientific excellence award committee of the French Ministry of Higher Education and Research. He was member of the national council of French universities and of the administration council of the University of Reims Champagne-Ardenne. He has been expert for many institutions, and national and international bodies.

Janan Zaytoon is the President of the International Federation of Automatic Control (IFAC) for the 2014-2017 triennium and the 20th IFAC World Congress is being prepared under his leadership to take place in Toulouse in 2017.

Website: http://crestic.univ-reims.fr/membre/207-janan-zaytoon

Anniversaries

During the past six decades of IFAC's existence there have been two major anniversary celebrations. On each ten-year mark, there is some recognition during the time of the Council and related meetings, but the 25th (Silver) and 50th (Golden) anniversaries were something special. These two special anniversaries are highlighted here.

1982 – Celebrating the 25th year

The anniversary planning was assigned to Manfred Thoma, IFAC's President-Elect and Pieter Eykhoff, a former Honorary Editor and Executive Council member, with support from Fred Margulies, the IFAC Secretary. It was determined that Heidelberg was the most suitable location for the event, since that was the founding location of IFAC in the late 1950s. By 1982, many of the original founders and early leaders of IFAC had either passed away, or were beyond their traveling age, so unfortunately many of these luminaries could not be in attendance. In remarks by Harold Chestnut, IFAC's first President, the following past luminaries were noted: Alexander Letov, Boris Petrov, Alexander Chelustkin, Boris Sotskov, Max Ajnbinder, Victor Broida, Keisuke Izawa, Giuseppe Evangelisti, Giorgio Quazza, Donald Eckman, Rufus Oldenberger, Hugo Schuck, Zdenek Trnka, Pawel Nowacki, Otto Benedikt, and William Wright. This list does not include all of the people who were lost during IFAC's first 25 years.

The 25th anniversary celebration attracted more than 200 participants, and consisted of several social events, and an International Symposium: "Impact of Automatic Control: Present and Future". A historical look at IFAC's first quarter century was prepared by John Coales, and circulated to the attendees. It also appeared in Automatica a year later. Coales, IFAC's fourth President, unfortunately was not able to attend the celebration. His contribution, "The Birth of IFAC and the Early Years" was printed and made available to all attendees of the celebration.

The Anniversary Symposium included the following keynote lectures:

25 years of IFAC: From Heidelberg to Heidelberg -- Harold Chestnut (later published in Automatica, Vol. 19, No. 3, pp. 337-340, 1983)

Impact on Technology -- Robert E. Larson (IEEE President)

Impact Caused by Robot Technology -- Ichiro Kato

Automatic Control and Information Processing -- Heinz Zemanek

Automatic Control: Impact on Society --Vadim A. Trapeznikov

Robots and People -- Howard H. Rosenbrock

Economic and Social Aspects of Modern Technology -- Eduard Pestel

Impact on Economy -- Arne Jensen

The Impact of Cybernetics and Systems Approach on Population, Environment and Resources -- Jong-Ming Wu

Impact on Developing Countries -- Alexander G. Evstafiev

The International Colloquium was opened by IFAC President Tibor Vamos, with a quote from Goethe and a description of the relationship of control and system science with Heidelberg itself. He reminded the audience that 1982 was just three years short of the 600th anniversary of the original documents that founded the great Heidelberg University. This institution became a stronghold of the sciences and philosophy – the "systems science" of earlier centuries. For IFAC to have been conceived in this particular location was consistent with the medieval roots of this community, and IFAC's modern role as the modern scientific home of control and systems science.

The October 1982 IFAC Newsletter, contained a brief summary of the event. Copies of IFAC Newsletters are available from the IFAC Secretariat.

2006 – IFAC's Golden Anniversary

A major celebration was to be held in Heidelberg, to mark the 50th Anniversary of IFAC's conception. There had been some discussion of the most appropriate year for the celebration. Although the conception of IFAC occurred in Heidelberg in 1956, the first constitution was formally adopted in Paris in 1957, so there has always been some vagueness surrounding the definition of the anniversary dates. Although the Heidelberg location presented some logistical challenges in regards to possible dates, there was an overwhelming sense and support to have the celebration at the IFAC founding location. The event was in the hands of Professor Rolf Isermann, an IFAC Advisor and IFAC Past Vice President, and supported by the German NMO. A summary of the event, including abstracts of the presentations, was published in the IFAC Newsletter June 2006 No. 3. More details may be found at https://www.vdi.de/technik/fachthemen/mess-und-automatisierungstechnik/weitere-veranstaltungen/ifac50/ifac-50th-anniversary-celebration

IFAC50

In addition to the celebration, an array of "IFAC50" projects was initiated under the leadership of Stephen Kahne, IFAC Advisor and Past President. A Task Force was formed with the following control specialists (and the countries of their NMOs): Ismail Chabini (US), Dan

Cho (KR), Rolf Isermann (DE), Sirkka-Lisa Jamsa-Joulena (F), Alex Kurzhanski (RU), Wook Kwon (KR), Zhong Li (DE), Mohammed M. Mansour (CH), Lucy Pao (US), Roman Prokop (CZ), Tibor Vamos (HU), Ljubo Vlacic (AU), and Stephen Kahne (US). It took four years of preparations to put the IFAC50 program together, and additional people joined the task-force, all making significant contributions to the effort. The intent was to not only reflect on prior accomplishments, but also to set the stage for the future.

--Creation of an IFAC Foundation. The announcement came in 2003, of an anonymous pledge of a US$500,000 gift to start an IFAC Foundation. It was eventually learned that this gift was contributed by Professor Wook Kwon of Korea, President of IFAC from 2005-2008. He had requested that the donor's name remain anonymous until after his eventual election as an incoming IFAC President. It was this single large gift that actually allowed the long standing plans to be realized for the creation of an IFAC Foundation.

--Online access to IFAC's technical output of scientific achievements.
By the mid-2000s, IFAC activities had generated millions of pages of scientific papers, but these were not readily retrievable. The anniversary marked the maturation of plans for making all these contributions available online. It would be several more years before this was finally realized, but the commitment to actually do it, was part of this project. The archive was to be known as IFAC-PapersOnLine (POL).

--Identification of significant early textbooks in the control field.
The history of the control field accelerated after WWII, partially based on wartime development, but also by text books that existed prior to the war, and soon thereafter. Historic Control Textbooks, edited by Professor Janos Gertler was published by the IFAC Publisher Elsevier Ltd in time for the Heidelberg celebration. That book captures some images from each of 62 textbooks from 21 countries.

--Timeline of control history. Intrigued by published timelines of events and activities in other professional fields the plan was to do the same for control. Unfortunately, finding the time and people to accomplish this challenging task, has been without success to this day. It remains an idea for the future.

--Enhanced access to educational materials in the control field. The intent here was to create a web based archive of interesting and otherwise unpublished materials and enhance the visibility and resources of the control community for a wider audience. A section of the IFAC website called Control Resources was created and continues to provide such materials.

--The history of IFAC, including its leadership and NMOs. This was the seed of the present book – The IFAC Story. This array of "IFAC50" projects, to commemorate the IFAC Golden Anniversary, led to several substantial advances in IFAC's contributions to the field of control and systems engineering.

The IFAC Foundation

From its earliest days the purpose of IFAC, has been to promote the science and technology of control theory and applications, throughout the world, and for the benefit of all. This has largely been done through publications, and by organizing technical meetings, where information is disseminated to attendees, and later to a worldwide audience. Resources available for doing this work have come from NMO fees, conference registrations, and in the later years, income from sale of access to publications. For the first few decades of its existence the IFAC budget could not support the needs in developing countries or educational institutions in remote parts of the world.

Michel Cuenod, the long-time (1959-1981) IFAC Treasurer from Switzerland, died in April 1987, four months before the seventh IFAC World Congress in Munich. His expertise in process control led to his participation in the founding of the Swiss IFAC NMO, the Swiss Federation of Automatic Control, and his leadership in that organization. Cuenod worked as a consulting engineer, for a Swiss company that designed and installed control systems for cement plants throughout the Middle East and North Africa. He also was a visiting professor at universities in some of these areas. During his many foreign assignments Michel, and his wife Jacqueline became very interested in the lives of the local people near these foreign work sites. They learned about the educational system in the surrounding areas and were struck by the very limited opportunities for higher education and research experiences for the local young people in these countries. He sought opportunities to help young students and their teachers to attend IFAC conferences, and to otherwise benefit from the intellectual stimulation of IFAC conferences and Congresses.

During the 1987 Congress in Munich, it was announced that the family and friends of Michel Cuenod had decided to set up a “Michel Cuenod Fund”. Later to be known as the “Michel Cuenod Trust Fund.“ The initial purpose was to provide financial support for young scientists to attend an IFAC World Congress if they had an accepted paper at that meeting. The Cuenods had spent several years in the Ankara region and had come to know many people at the Middle East Technical University (METU). They felt particularly close to this group of scholars. At first, the original support from the Cuenod Fund was restricted to authors from METU in Ankara. The Cuenods requested that colleagues within IFAC could also make donations to this effort if they wished. There were several efforts to solicit donations from individuals and outside groups. IFAC agreed to help manage the funds, which would ensure that appropriate financial controls were in place to meet the expectations of the donors.

These steps raised IFAC’s interest in expanding similar support to people in other developing countries. It can be seen as the initial seed of an IFAC Foundation. Several of the IFAC Past Presidents were personal friends of the Cuenods, served as Trustees of the Fund, and it re-

mained a rather informal arrangement for several years. During Brian Anderson's Presidential term (1990-1993), President Elect-Stephen Kahne and Vice President Yong Zai Lu were tasked with exploring this new philanthropic role for IFAC, building on the earlier experiences with the Cuenod Trust Fund. It resulted in a proposal from IFAC to encourage its NMOs to set up national foundations, with similar goals as the expanded Cuenod Trust Fund. Beneficiaries of the IFAC effort included authors of IFAC conference papers from many developing countries, both with and without IFAC NMOs. Since tax laws were so different from country to country and the level of financial support was so low at the time of these plans, it did not seem feasible for IFAC itself to create a foundation with the goal of supporting IFAC conference authors. Some commitments were initially reported by NMOs of China, Japan, Romania, and the UK. It did, however, indicate within the IFAC community that there was a need to help raise funds for authors from developing countries to be able to present their papers. These authors often had much to offer the other meeting attendees if they could only find the funds to participate in the conference.

The Cuenod Trust Fund continued during the Presidencies of Kahne, Lu, Albertos and Kucera. An estimated 50 or so young authors from developing countries benefitted from small grants of support for presenting papers at the IFAC Congresses. A few of them even gained support for presentation at IFAC symposia. IFAC managed the funds on behalf of the Cuenod Trustees, while exploring ways to expand these philanthropic activities.

In 2003 it became known that an anonymous donor planned to make a major financial contribution to IFAC, with the condition that a mechanism was in place to continue the work started by the Cuenod activity, and an expansion into related support functions for control engineers in developing countries. This wonderful opportunity mandated that IFAC would establish a formal international IFAC Foundation, with legal and financial controls, to ensure that the funds were handled properly and spent in a manner consistent with the donor's wishes. It would also be necessary to develop a structure that was independent of IFAC itself, yet aligned with IFAC's goals. The first formal enumeration of goals and objectives was created in 1996, and at that time was more related to the emerging national IFAC Foundations than to the newly feasible international IFAC Foundation. Now it was time to create an international foundation.

The legal structure of the IFAC Foundation required compliance with Swiss Not-For-Profit Corporation Law. Bylaws were drafted between the 2003 and 2004 meetings of the IFAC Council and in 2004 the IFAC Council approved the Bylaws draft ready for that Council meeting. In 2005 the IFAC General Assembly approved these Bylaws as well.

Some of the main points of the IFAC Foundation Bylaws included –

Headquarters in Switzerland

Not-for-profit status

Goals and activities consistent with those of IFAC

Legally and financially appropriate

Self-supporting with certain management expenses paid by IFAC

Includes endowment and project accounts

Activities include fund raising, project selection, outreach, consistent with donor wishes

Focus on developing countries and their populations to participate in IFAC activities

Nine-member board of trustees with term limits

Annual board meetings and financial reports and periodic audits

Periodic report to the IFAC Council for information

To facilitate management of the IFAC Foundation the Board of Trustees was divided into two groups. Three members are Foundation Trustees and the others are Foundation Experts. The latter group advises the former in all matters related to the Foundation. Terms of office rotate triennially with a six year term limit in each role. The first Foundation Trustees were Pedro Albertos (Chair), Stephen Kahne (Vice Chair), and Lino Guzzella (Secretary). The first Foundation Experts were Peter Fleming, Hidenori Kimura, Vladimir Kucera, Wook Kwon, and Manfred Thoma.

With the inclusion of the US$500,000 that was finally announced as having come from Professor Wook Kwon of South Korea and other donations that had existed in the IFAC accounts, including the Michel Cuenod Trust Fund, the IFAC Foundation was launched in Spring 2008. In addition to small financial income from (very conservative) investments, solicitation of funds began from various sources including anticipated donations from NMOs that hosted IFAC Congresses every three years. Major activities of the IFAC Foundation were to support authors from developing countries to deliver their papers at IFAC Congresses, to organize Regional Courses in developing countries that do not have IFAC NMOs to audiences consisting of control scientists in those countries, and fund raising. Regional Courses in North Africa, South East Asia, and Central America were supported. Several authors from developing countries were supported if their papers were presented at IFAC Congresses. Since the 2008 Congress the Foundation has supported some of the expenses of about 25 authors per Congress. Organizers from the NMOs where IFAC Congresses were held generously made donations to the Foundation from surpluses generated by their Congresses. IFAC technical meetings that were not Congresses have requested funds for authors from developing countries at their event. Very limited funding for such support has been provided. Foun-

dation funds cannot be used to support the organization of IFAC Symposia or Workshops in countries where an IFAC NMO exists. NMOs who have competed for the privilege of hosting future Congresses included commitments to provide Foundation support as part of their bids.

The Board of Trustees created an appropriate infrastructure for initiating and managing these activities and developing a presence on their own website with proper linkage to the IFAC website as well. In more recent times a Foundation award for contributions to sustainability efforts has been created. Although progress in this new venture has been quite slow, there is a structure in place that assures success into the future as long as donations are available to support the work to benefit those from developing countries.

IFAC Traditions

Some international organizations have a variety of cultural traditions: an anthem, a flag, a logo, etc. IFAC had a logo that was created in the earliest days of the Federation and just after 2014 adopted a new logo as part of a branding study that yielded some guidelines concerning style and presentation standards. Since all of IFAC's technical activities are actually conducted by its various NMOs or with journals actually owned by a commercial publisher there has been a tendency to have a variety of images (conference logos for example) that may be hard to associate with IFAC due to rather loose requirements on graphic images identifying IFAC as the sponsoring society. The post-2014 graphic standards and new logo were developed to bring all such images into compliance with a new standard. IFAC does not have an anthem, a motto, or a flag.

There are two traditions that were created about 20 years after IFAC's foundation in the late 1950s. In this note the IFAC Congress banners and the IFAC Presidential Tapestry are explained.

Each World Congress from the beginning in Moscow (1960) developed a logo for each event. Typically these somehow incorporated a feedback loop that is the generally recognized image associated the field of control systems. In the early 1970s as the USA was preparing to host the 1975 World Congress in Boston and Cambridge, the Chairman of the Congress National Organizing Committee, Nathan Cohn, suggested that a banner be produced to represent this Congress. Subsequently it was suggested to IFAC that such a banner become a standard device for each ensuing Congress. It was suggested that the banner for the following Congress be revealed at the closing ceremony of the preceding congress as part of the presidential handover process. Thus at the Boston Congress it would be necessary that the banner for the upcoming congress in Helsinki be displayed at the Boston closing ceremony. In order to facilitate this proposed tradition, the 1975 Congress hosts offered to produce a standard banner for all of the preceding Congresses as well as a banner for the 1978 Congress to be held in Helsinki. This idea was well received by IFAC and so was implemented in Boston.

IFAC Banner

At the time of the Seoul Congress in 2008, the Korean NOC produced a beautiful hard copy "Book of Banners" that was given to all Congress attendees. It has a full color image of all the IFAC Congress banners from Moscow to Seoul. It can be seen that the banners for the first seven Congress look very much alike. That is because they were all produced in the United States by the same company just prior to the 1975 Boston Congress so they could be displayed at the opening and closing ceremonies. Thus, the typefaces and layouts are very similar. The first new banner produced in the home country of an IFAC Congress was produced

in Japan for the 1981 Congress but done in time for the Helsinki Congress. The style was a bit different and all subsequent Congresses have followed this tradition. The Congress banner is produced by the host country and made available three years prior to their Congress to be displayed for the first time at the preceding closing ceremony. Over the years the Congress symbol as reflected something about the venue for the Congress but the dimensions and overall look of the banners has followed the original pattern established in 1975. All banners are shipped from one Congress organizer to the next and traditionally the entire set is displayed at the opening ceremony and throughout the Congress. At the closing ceremony the banner for the next Congress is displayed for the first time with all the others. Because of the way the banners are used at the congresses all banners are of the same physical size and general shape.

Presidential Tapestry

A second tradition is the creation and use of the IFAC Presidential Tapestry. The 1969 IFAC Congress was in Warsaw, Poland with Pawel Nowacki serving as President for the 1966-1969 triennium. Nowacki had been in IFAC's founding group in the 1950s. His daughter Irena Nowacka, a weaver and painter, accompanied him to numerous social events during the Congress week and began a lifelong involvement with the IFAC community. She subsequently moved to the United States and married Professor Stephen Kahne (who would later be IFAC President in the 1990s). Soon after moving to the US she had the idea of creating an artistic piece in honor of her father's leadership in IFAC and created an artistic tapestry incorporating the IFAC logo that IFAC decided to use as a symbol of the IFAC Presidency.

Beginning in 1975 in Boston, this tapestry has been used in the presidential transition part of the closing ceremony of each IFAC Congress. It is displayed on stage at that event and, at the discretion of the Congress NOC, may be used at other events during the Congress week as well. The President keeps this tapestry during the ensuing triennium, displaying it in his/her office or home, and then returns it to the Congress at the end of the triennium to be passed on to his successor. The back of the tapestry has a place for the President to add his name to the ever-growing list of IFAC Presidents.

Some Reflections on Control Education in IFAC

As contributed by Professor Bozenna Pasik-Duncan of the University of Kansas in the US

Sixty years ago a declaration to create an International Federation of Automatic Control (IFAC) was signed. For the past 60 years IFAC has fulfilled its original purpose "to promote the science and technology of control in the broadest sense, in all systems". From the very beginning IFAC demonstrated a strong interest in control education. It focused on identifying the best control textbooks that were used successfully in teaching foundations of systems and control. An important collection of historic control textbooks was presented in "Historic Control Textbooks", edited by Janos Gertler, and published on the occasion of the 50th anniversary of IFAC. To recognize contemporary excellent textbooks, an award for the best Control Engineering textbook was created in 1986, and named the Harold Chestnut Control Engineering Textbook Prize. The name was updated in 2002. It recognizes the author(s) of the textbook(s) judged to have most contributed to the education of control engineers. The funds for this prize were donated by the family of Harold Chestnut, IFAC's first President. The award is presented at each IFAC Triennial World Congress.

Textbooks

The textbooks, in particular those winning ones, became a subject of lively discussions at conference Special Sessions on Education: New Challenges and Opportunities in Control Education; Open Forum – Conversation with the authors of the winning textbooks of the Harold Chestnut Control Engineering Textbook Prize. The purpose of those sessions, are to discuss and come up with criteria for writing outstanding control engineering textbooks. They also help identify other resources for innovative teaching and learning control systems ideas and technology that are accessible to students from diverse backgrounds.

With continued development of control laboratories, control education experiments, computer aided design, as well as distance and virtual education technology and control textbooks, control has become an exciting area of IFAC activities. There has been a continuous demand for new methodologies for improving the theory, practice and accessibility of control systems education.

University education and continuing education issues in control have become a subject of important discussions in engineering and science communities. There was a perceived need to hold the meetings focused on control education. The first IFAC Advances in Control Edu-

cation (ACE) Symposium was held in Swansea, UK in 1988. Since that time the ACE has been held regularly every 3 years up to 2012, and frequently after that.

The IFAC education community has recognized that control systems technology has continued to change rapidly, causing a need to continually revise the way students are educated. Moreover, alongside technological advances, there has been an increasing awareness of what constitutes an effective learning environment and the general perception has been that this is vastly different than traditional models. A recognition of the importance of education was evidenced by the existence of educational committees within many engineering institutions, including the IEEE.

Partnerships

A partnership between two committees – the IEEE Control Systems Society (CSS) on Control Education and the IFAC Technical Committee on Control Education was established at the IFAC World Congress in Barcelona, July 2002. Joint leadership became a tradition in these organizations.

The opportunities to apply control principles and methods were exploding around 2000. New developments in an increasingly information rich world demonstrated a need for a significant expansion of the basic tool sets of control. Control resources were collected. A preliminary website devoted to control resources was authorized and created by IFAC in 2008 and updated recently. The control education committees came to the conclusion that good practices in teaching of control could be shared with high school teachers to reach pre-university students.

At the 2000 American Control Conference (ACC) the AACC Committee on Education co-sponsored the First National Science Foundation (NSF) Workshop for High School Teachers who were the presidential awardees from all over the United States. It was a big success in promoting automatic control among teachers. The U.S. NSF recognizes the importance of its funded programs impacting the general public through its “Criterion 2” (Broader Impacts) in evaluation of all submitted proposals.

The goal to promote the broader impacts of automatic control through outreach programs such as workshops for middle and high school students and teachers, special sessions, and through developing “plain talks” and videos by young scientists in each technical area for a wide range of communities became one of the major goals for IFAC education activities. Since 2000 the joint committees on control education have strived to bring control system concepts and technologies to the awareness of high school and middle school students and teachers.

Control is used in many common devices and systems, such as computer hard drives, VCRs, automobiles, and aircraft, but is usually hidden from view. The goal of the committees is to

promote an increased awareness among students and teachers of the importance and cross-disciplinary nature of control and systems technology. Through these outreach activities control became naturally recognized by teachers and students as a field that spans science, technology, engineering and mathematics (STEM).

The first major joint activity between IFAC & CSS education committees – the High School Students and Teachers Workshop on the Power, Beauty and Excitement of the Cross-Boundaries Nature of Control was held at the 2005 IFAC World Congress. The workshop aimed to inspire interest from youth towards studies in automatic control and to assist high school teachers in promoting the discipline of automatic control among their students. It comprised several short but effective presentations on various problems from the real world that have been solved by using control engineering methods, techniques and technologies. The following topics were presented: “The Power of Feedback”, “When Computers Control: Joys and Perils of Automation”, “Future Careers in Mechatronics and Control Systems”, “Increased Role of Automation Techniques in Large Industrial Projects”, “Random Walk around Some Stochastic Control Problems in Telecommunication, Finance and Medicine”, “Cooperative Driverless Vehicles”, and “Robotics and Control”. Live interaction between presenters and the audience was an important feature of the workshop. That first time, jointly organized by IFAC and IEEE CSS workshop, followed an already existing model of the outreach program in CSS and American Automatic Control Council (AACC).

2016 marked the sixteenth anniversary of the Ideas and Technology Control Systems workshops for middle and high school teachers and students, renamed recently as the Power, Beauty and Excitement of Cross-Boundaries Nature of Control, a Field that Spans Science, Technology, Engineering & Mathematics (STEM).

These workshops are held twice a year in conjunction with the ACC, CDC and IFAC Meetings and Congresses. From 2000 to 2016, over 10,000 middle and high school students and their teachers as well as undergraduate students have been reached through these educational activities. Over 170 academic and industry representatives have shared their passion and have given inspirational talks at these workshops.

The purpose of these workshops is to increase awareness among students and teachers of the importance and cross-disciplinary nature of control and systems technology in everyday life. The workshops show the power of cross-boundary research and have been presented to students and teachers in Atlanta, Baltimore, Chicago, Denver, Las Vegas, Los Angeles, Maui, New Orleans, Orlando, Portland, San Diego, Seattle, St. Louis and Washington, D.C. Boston, as well as in the Czech Republic, Cyprus, South Korea, Poland, Spain and South Africa.

The long-term health of the control field, which spans science, technology, engineering, and mathematics, depends on its continuous success in attracting the most gifted young people

to the profession. Early exposure is the key to that goal. The idea is that education is at all levels an inclusive process. It should integrate scholarship, teaching, and learning both horizontally and vertically—creating a learning experience for students of all ages, from K-12 to higher education and beyond.

Through those sixteen years, the model of a sustainable outreach partnership among our control communities and the school districts at the places where our major conferences are held was established and subsequently followed by other organizations and societies. This outreach partnership has provided a vehicle for demonstrating the importance of control.

The workshop activities include presentations by control systems experts from the control community, informal discussions, and the opportunity for teachers to meet passionate researchers and educators from academia and industry. A discussion format called “Plain Talks” was initiated, and this initiative was closely related to the outreach efforts. The goal was to develop short and inspirational presentations for teachers and students but also for non-control engineering communities.

One of the major challenges for the control communities is to enhance their own public image and convey the essence and contribution of the field to outsiders. That effort was focused on conversations about what we can do to be better communicators of our field with the broader community. The Special Sessions on Education provided a forum for having a dialogue focused on innovative methods of teaching and integrating research and teaching. The recent discussion at these well-attended special sessions has been focused on multiple challenges and opportunities that are presented to students preparing for careers in science and engineering. One of the most important challenges for scholars and educators from academia and industry is to find the best way for cultivating student interest in STEM.

A recent workshop for middle and high school students was held at the 2016 ACC in Boston.

The workshop was created to attract students and teachers to automation by demonstrating the importance, power, beauty, diversity, and excitement of control - a field that spans STEM.

About fifty participants attended the workshop, from summer STEM programs at Boston University and Northeastern University. Eight speakers delivered exciting talks on a wide range of topics in control and its applications that were educational, engaging, inspiring, and motivating for further learning about control.

The topics presented at the workshop include:

Bio-inspired Control Engineering, What Animals Teach, The Miracle of Stabilization, Control of Complex Networks, Molecular Robots, Joys and Perils of Automation, Traffic Control in Smart Cities, Networked Systems and Society, Autonomous Robots through Feedback Control and Machine Learning, Investigating Group Behavior in Dance.

Part of the standard protocol of these events is to solicit immediate feedback from the attendees at the end of the day. For the 2016 event students were asked: What was the most important thing you learned today? Here are a few of their answers:

“I learned that control systems are in just about everything. They play a big role in electronics and autonomous machines”.

“The most important thing I learned today is that stabilization needs control, and how complex that can be”.

“The most important thing I learned today was how much the field of control actually relates to many different areas and fields of science. I have also learned about experiments that do things I never thought possible”.

“In order to create automatic cars, a lot of thought has to be put into not only the system of the car, but also surrounding systems”.

“The most important thing I learned today is how scientists can study nature and human movements to implement them in robots”.

“The idea of molecular robots was entirely new to me and I think it holds a lot of potential for future developments”.

“It amazed me to see how creative and innovative the speakers were in using STEM. Robots dancing? Building DNA rods? Analyzing bat movement? It’s crazy to me how everything has the ability to be figured out or solved just using STEM”.

Another workshop was held at the CDC2016 in December in Las Vegas. It was for the same school for which the workshop named at that time as “Control Awareness Day” was organized 14 years ago, in December of 2002. In preparation for this event the same teacher was engaged in the 2016 workshop. 2002 was her first year of teaching. 14 years later she writes: “How wonderful that we can be reunited in making this event happen again in Las Vegas. I'm working today on extending the invitation to our students and will prepare for us to take the first 100 students who return the paperwork, to attend. I look forward to seeing the new innovative STEM research. How exciting!”

IFAC has recognized a need for making automatic control accessible for teachers, pre-university students and for a wide range of the public. IFAC created a position of Education Liaison on the IFAC Technical Board to connect all technical committees' liaisons to education. The mission of the TC Liaisons to education is to promote control education in all technical areas of IFAC. Their major goal is to promote the broader impacts of automatic control through outreach programs such as workshops described above as well as through special sessions on education, and through developing plain talks and videos in each technical area for different communities and different setting.

Education has been playing an important role in IFAC. IFAC is committed to promote education.

One day is devoted to education at the 2017 IFAC World Congress in Toulouse, France.

That day will be called Control Education Awareness Day (CEAD). Special Panel Session on "Preparing Tomorrow's Scientists and Engineers for the Challenges of the 21st Century" is one of a few major education activities. This Special Panel Session on Education will focus on multiple challenges and opportunities that are presented to young investigators preparing for careers in science and engineering and will address important control engineering education issues of balancing math, science and technology in engineering education. The main questions to be addressed are: How do we integrate research and education? What we, scientists and educators, should do about cultivating student interest in science, math and engineering?

Is it important for control engineering students to know math and science? Should control engineering education focus mostly on engineering? What kinds of control engineering textbooks are popular among students? Do they need textbooks? Should engineering education focus mostly on technology? The expected output of this session are recommendations to the control community on how to integrate education with research and how to attract science and engineering students to the field of automatic control. This session is a continuation of a similar very popular and successful session held at the 2011 IFAC World Congress in Milan, Italy.

The current focus in control education is on technology in integrating research and teaching at all levels, vertically and horizontally. Automatic control of multidisciplinary and interdisciplinary nature is a fascinating field, which is open for new opportunities and challenges in discoveries of new connections among different fields and disciplines, new communication and collaboration.

With curiosity and creativity young investigators can find easily control to be a fascinating area for studying, learning, and conducting research to be prepared for amazing careers in science and engineering. Control systems now play critical roles in many fields that include

electronics manufacturing, communications and telecommunications, transportation, finance, biology, biomedicine, actuarial sciences, computer and networks, neuroscience and computational neuroscience, neurology, many biological systems and many military systems.

Countries with NMOs

Country: Austria

NMO: “Austrian Society for Robotics and Automation – ÖGART".

Date Founded: February 1, 2002

Early History: Austria is one of the founding members of IFAC. The Austrian National Member Organisation (NMO) was the “IFAC Advisory Board Austria” in the “Austrian Centre for Productivity and Efficiency- ÖPWZ” until the end of December 2003. From January 1, 2004 the Austrian NMO has been the “Austrian Society for Robotics and Automation – ÖGART".

Method of Operation: Austrian Society for Robotics and Automation (ÖGART). ÖGART was founded in February 2002 as a non-profit association with the seat in Vienna. Its activity extends to the entire territory of the Federal Republic of Austria. It is the legal umbrella of the “IFAC Advisory Board Austria”.

President: Sektionschef i.R. Dr. N. Rozsenich

Secretary General and Vice-President: Dr. P. Kopacek

Vice- President : Prof. Dr. A. Weinmann

IFAC activities in Austria are jointly coordinated by ÖGART (www.ifac-austria.at)

Exemplary Contribution of the NMO to the work of IFAC:

Thanks to the excellent preparatory work, done by Norbert Rozsenich, on April 21, 1978 an agreement was signed between the Austrian Government, represented by Minister H. Firnberg, and IFAC, represented by the IFAC presidents U. Luoto, Y. Sawaragi and T. Vamos, to install the permanent General Secretariat of IFAC in Laxenburg near Vienna with a financial contribution of the Austrian government. From the Austrian side the “Austrian Academy of Sciences” was responsible for the administration of the IFAC Secretariat opened in Laxenburg near Vienna in 1978.

Austria was also responsible for the foundation of the TC on “Social Aspects of Automation” – Fred Margulies 1969 and the TC on “Supplemental Ways for Improving International Stability – SWIIS” - H. Chestnut and P. Kopacek 1983.

From 1967 up to now approximately 50 IFAC events have been organized by the Austrian NMO in Austria and abroad. In the next years 5 additional IFAC events are approved. A proposal for one of the next IFAC World Congresses was submitted and presented in Chicago 2015.

Members of the Austrian NMO were involved in founding the Kosovo IFAC NMO and are now discussing with Albania a possible IFAC NMO to join IFAC.

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Austria in IFAC ,1956 – 2006

A brief history of the Austrian IFAC NMO Compiled by: Peter Kopacek

http://www.ifac-austria.at/html/englisch/50%20Jahre.pdf

Informal Meeting, Laxenburg, April 1985. From left to right: G. Hencsey, B. Tamm, T.Vamos, M. Vamos, M.Thoma, M. Mansour, B. D. O. Anderson, W. E. Miller

NMO: graduate school SOCN (Systems, Optimization, Control, and Networks) (replaces for several years the federation IBRA-BIRA (Institut belge de Régulation et d'Automatisme and Belgisch Instituut voor Regeltecchniek and Automatizering)

Date Founded: The federation IBRA-BIRA has been founded in 1955 (June 15)

Early History: Two Belgians signed the resolution that created IFAC : Mr Ajbinder and Passau

Exemplar Contribution of the NMO to the work of IFAC: Belgium organized several IFAC events over the years, The most recent ones are SYSID (2009, Brussels), DYCOPS-CAB (2010, Leuven), Workshop on Time Delay Systems (2004, Leuven).

NMO: IFAC-Canada

Date Founded: 1959

Early History: The NMO in Canada was initially constructed as an associate committee of the National Research Council of Canada (NRC) and was called the Associate Committee on Automatic Control (ACAC). In late 1979, ACAC recommended to NRC that its major objective should be to form a new Canadian professional engineering organization to support the Canadian controls community, which would carry out those ACAC functions other than those involving international relations and IFAC. As a result in 1984 NRC formed the Canadian National Committee for IFAC (CNC/IFAC) which became the Canadian NMO . The Canadian Industrial Computer Society (CICS) was formed, taking over sponsorship of events and publishing of the bulletin previously performed by ACAC within Canada in 1980. During the period 1995-97, CICS served as the Canadian NMO.

Method of Operation: Since 1998, the NMO has been operating as IFAC – Canada. This final stage in the development of the Canadian NMO resulted from a vote at the 1997 annual meeting of the CICS Board of Directors, where members voted in favor of the name change from CICS to IFAC-Canada. IFAC Canada continues to operate to further the aims and objectives of IFAC within Canada under the direction of a Board of Directors, who are based in academia.

Exemplar Contribution of the NMO to the work of IFAC: IFAC Canada has made significant contributions to the dissemination of the practice of control engineering, both in the wider international community but also achieving significant impact nationally. The IFAC Symposium on the Digital Control of Large Industrial Systems was held in Toronto, Ontario, June 17-19, 1968 during a time of rapid development in the area of digital control and was notable for prescribing that ‘papers had to be based on an actual working process control computer installation’. A large number of papers were from Canada and the US, but the meeting also had about a third of the papers coming from Europe, Russia and Japan. Given the scope, the Symposium was practically oriented. In a subsequent discussion of the meeting in Automatica, the state of the art was summarized. Performance and reliability of the central processor was seen to be quite good with problems generally occurring due to peripheral devices and analogue to digital and digital to analogue converters. In terms of design techniques, PID was prominent with significant benefits being seen from enhanced filtering and improved feed-forward control. IFAC Canada also organized the 1st IFAC Workshop on Space Robotics at St-Hubert, Quebec during October 19-22, 1998. Space Robotics became a national “area of interest” and was subsequently recognized on some of the Canadian bank notes.

Canadian Bank Notes celebrating robotics

Bibliography:

H. A. Spang III, A look at the IFAC/IFIP Toronto symposium on “Digital control of large industrial systems”, Automatica, Vol. 5, pp. 131-134, 1969.

NMO: Czech National Committee of Automation, Czech Society of Cybernetics and Informatics

Date Founded: 1958

Early History:

In 1956, Vladimír Strejc (Czechoslovak Academy of Sciences - CSAV) and Bořivoj Hanuš (Technical University in Liberec) attended the first international conference on automatic control held in Heidelberg, Germany. At that occasion, they were among the 30 participants who signed a declaration in which the need to create an international organization of automatic control was clearly defined. At the 1st IFAC World Congress in Moscow in 1960, prof. Zdeněk Trnka (CVUT) was elected as a member of the IFAC Council for the period 1960-1963. At the 2nd IFAC World Congress in Basel in 1963, doc. Jiří Beneš (Czechoslovak Academy of Sciences - CSAV) was elected as a member of the IFAC Council for the period 1963-1969.

Method of Operation:

The Czech National Committee of Automation was established as the NMO of IFAC to administrate the membership and to process the financial support provided by the Czech government through the Czech (formerly Czechoslovak) Academy of Sciences.

Exemplar Contribution of the NMO to the work of IFAC:

Vladimír Strejc in 1967 founded a series of symposia on systems identification - IFAC Symposium on System Identification - that still exists today. The first two meetings took place in Prague in 1967 and 1970's. Vladimír Kučera (Czechoslovak Academy of Sciences - CSAV) founded in 1989 a series of symposiums on the systems structure - IFAC Symposium on System Structure and Control - which still exists today. The first two meetings took place in Prague between 1989 and 1992, then another in 2001. Undoubtedly the most important event of the Czech participation is the 16th IFAC World Congress held in Prague in 2005. IFAC president was Vladimír Kučera (CVUT), the General Manager was Michael Šebek (CVUT), the program committee was chaired by Petr Horáček (CVUT) and Miroslav Šimandl (University of West Bohemia, Pilsen) and editor of the Proceedings was Pavel Zítek (CVUT). The congress was attended by 2,500 experts from 63 countries and became the largest specialized event in the history of the field of automatic control.

Dozens of minor IFAC events were held in the Czech Republic over the years including, for example IFAC Symposium on Fluidics, Prague 1971; Symposium on Software for Computer Control, Prague; Symposium on Technical Diagnostics, Prague 1989; Workshop on Mutual

Impact of Computing Power and Control Theory, Prague 1992; Conference on System Modelling and Optimization, Prague 1995; Symposium on Robust Control Design in Prague 2000; Workshop on Modelling for Manufacturing Management and Control, Prague 2001; Workshop on Programmable Devices and Embedded Systems, Brno 2006; Workshop on Time Delay Systems, Prague 2010; Conference on Programmable Devices and Embedded Systems, Brno 2012; Conference on Programmable Devices and Embedded Systems, Velké Karlovice 2013.

Czech scientists and engineers played important roles in various IFAC positions and bodies: Vladimír Kučera (Council member 1987-2008; Vice President 1993-2001; President 2002-2005; Advisor since 2008); Michael Šebek (Council member 2008-2014; Awards Com since 2014); dozens prominent experts has long worked in the executive and technical committees of IFAC.

Bibliography:

M. Sebek: Conference report - 16th IFAC world congress: the largest automatic control conference ever. IEEE Control Systems, Year: 2006, Volume: 26, Issue: 1 Pages: 107 - 110, DOI: 10.1109/MCS.2006.1580164

Some impressions of the Czech participation in the 16th IFAC World Congress held in Prague in 2005.

NMO: Estonian Association of Engineers

Date Founded: 1993

Early History: The history of IFAC activities in Estonia dates back to the soviet time, when the NMO of Soviet Union organized a number of IFAC conferences. For instance, the XI IFAC World Congress took place in Tallinn in 1990 under the presidency of Boris Tamm. After the restoration of independence in 1991, the members of the organizing committee from Estonia (including Boris Tamm, Ülo Jaakso, Leo Mõtus and Ants Wõrk) established national member organization of IFAC. The formal acceptance decision was approved at the IFAC world congress in 1993.

Method of Operation: Informal, since Estonia is a very small country.

Exemplar Contribution of the NMO to the work of IFAC: A number of events oriented to students were co-organized by the Estonian Association of Engineers. Members of the Estonian NMO actively participate in the work of different IFAC TCs.

Bibliography:

While Estonian NMO does not possess a separate bibliography database, national research portal https://www.etis.ee/Portal/Publications/Index allows retrieval of all IFAC related publications using keyword filter.

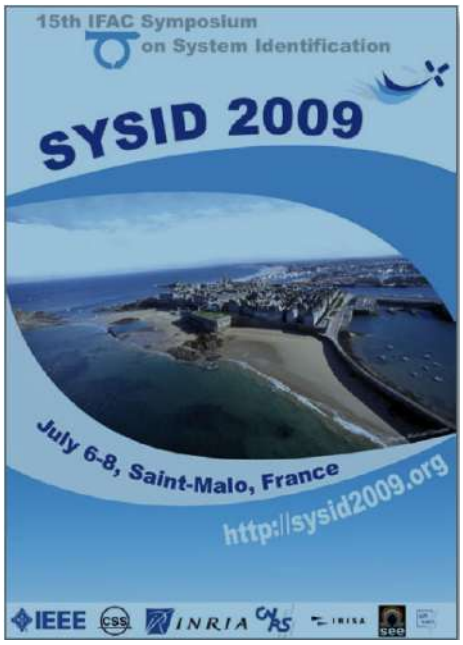
http://www.insener.ee/

NMO: Société de l'électricité, de l'électronique et des technologies de l'information et de la communication (SEE)

Date Founded: 1959

Early History: At the end of the Heidelberg International Conference on Automatic Control (1956), a Provisional Committee was established under the chairmanship of Victor Broïda of France to draft the first IFAC constitution.

On September 12, 1957, the first General Assembly convened at the constituent meeting in Paris. Delegates from 18 countries representing their national organizations assembled at the Conservatoire National des Arts et Métiers with Victor Broïda as chair. They voted on a constitution and bylaws; elected the first IFAC President and Executive Council members and appointed the chairs of committees.



On that occasion, Victor Broïda was elected second Vice-President and appointed first Honorary Editor of IFAC. He was also the sixth President of IFAC, from 1969 to 1972.

Despite being very involved in the foundation of IFAC, France joined the federation as the 22nd member, following long negotiations about the nomination of members of the executive committee. The French NMO was initially AFRA (French Association for Regulation and Automatic Control). In 1968 AFRA was dissolved and the NMO became AFCET (French Association for Economical and Technical Cybernetics). This situation held until SEE became the NMO from January 1999.

Method of Operation: IFAC activities in France are jointly coordinated by SEE and the national research group/network GdR MACS of CNRS (Groupement de Recherche en Modélisation, Analyse et Conduite des Systèmes dynamiques of the Centre National de la Recherche Scientifique). The official NMO, SEE, is a national association that has broad scope, spanning many electrical engineering and IT domains. It is much broader than the activities of IFAC. For this reason, the IFAC activities are mainly delegated to GdR MACS, which is a CNRS national research group on Control and Automation, involving more than 2000 members.

Exemplar Contribution of the NMO to the work of IFAC:

Hosting more than 100 IFAC events, including the 1972 and 2017 World Congresses, and the inaugural general assembly of IFAC on September 12, 1957.

In 2009 and 2010, SEE has worked with the IFAC Foundation to provide support for young authors from developing countries to attend 4 IFAC events in France.

- Edition of an IFAC-in-France booklet in 2009

Establishment of an IFAC French NMO annual Award and an IFAC French NMO service Award (since 2005)

Contribution to the establishment of IFAC NMOs in India and in North Africa

The French NMO hosted the 15th IFAC Symposium on System Identification in 2009.

NMO: VDI/VDE-Gesellschaft Mess- und Automatisierungstechnik (GMA)

Date Founded: 1973

Early History: The German NMO, the VDI/VDE-Gesellschaft Mess- und Automatisierungstechnik (GMA), and its predecessor organization played an important role in the foundation and history of IFAC. In September 1956 an international conference on "Regelungstechnik – Moderne Theorien und ihre Verwendbarkeit" (Automatic Control – Modern Theory and Their Applicability) was held in Heidelberg. About 700 delegates took part in this conference. At this event the idea of the foundation of an international federation in the field of automatic control was born. Dr. Gerhard Ruppel from VDI and secretary of the predecessor organization of GMA was one of the key persons at that time. In April 1957 a meeting took place at the VDI office in Düsseldorf to prepare the establishment of IFAC. The ideas of Heidelberg and Düsseldorf led to the foundation of IFAC in Paris in summer 1957.

Heidelberg 2006: Fireworks during the 50th anniversary event at Heidelberg Castle

Method of Operation: The VDI/VDE-Gesellschaft Mess- und Automatisierungstechnik (GMA) is the national network of experts in the field of measurement and automation technology. GMA is part of the two major associations of German Engineers VDI and VDE and represents the interests of more than 23,000 individual members – from industry, academia and science. GMA is organized in about 70 technical committees and bodies that have a mostly industrial scope. The academic side is represented by the IFAC TCs. GMA has an large network of engineers and researchers in the fields of measurement and fields of measurement and automatic control. 1,500 experts are actively engaged in the 70 TCs of GMA. Industry and academia are both represented on the GMA council.

Exemplar Contribution of the NMO to the work of IFAC: From 1957 to 1974 the first Secretariat of IFAC was installed at the VDI headquarter in Düsseldorf. It was organized by Dr. Gerhard Ruppel and Lieselotte Schröder. Due to the fact, that the idea of IFAC was born in Heidelberg, the events for the 25th and the 50th anniversary of IFAC were organized in Heidelberg.

Since 1957 more than 60 major IFAC events have been held successfully in Germany and many important IFAC conferences series have their origin in Germany, e.g. Multivariable Control (Düsseldorf 1968), Man-Machine Systems (Baden-Baden, 1982), Transportation Systems (Baden-Baden 1983), Fault Detection, Supervision and Safety (Baden-Baden 1991) and Mechatronic Systems (Darmstadt 2000).

NMO: (1) Automatic Control and Dynamic Optimization Society (ACDOS), 2012 - Continuing

(2) Institution of Engineers India (IEI), 1959-1994

Date Founded:

(1) ACDOS was founded on 08 July 2011

(2) IEI was founded on 13 September 1920

Early History:

1. Institution of Engineers (India), known as IEI, was established in 1920 to promote an environment to enable ethical pursuits of professional excellence for engineering fraternity in the country so as to provide leadership for serving the humanity in an inclusive manner. The main objective of IEI is to promote and advance the science and practice of engineering in all its branches and to facilitate the exchange of information. After the foundation of IFAC on 12 September 1957 by 18 counties, Israel and Finland joined IFAC as 19th and 20th IFAC in 1959. Around the same time, IEI expressed its interest to promote the cause of IFAC in India and, after due formalities, became the 21st national member organization (NMO) of IFAC on 01 March 1959. Interestingly, despite IFAC being born in Paris, the French NMO also formally joined IFAC at the same time as the 22nd NMO of IFAC. In view of this, India's representation in IFAC can be traced back to almost the same time as the inception of IFAC itself.

It is interesting to observe that India got her independence on 15-Aug-1947 after almost 200 years of British rule. Both the economy as well as the intellectual strength of the country was not in a good shape at that time. Subsequently there were drives towards industrial growth, science and technology development, ramping up of new institutes of higher learning, international collaboration etc. Unfortunately, however, for a variety of reasons (including wars and natural calamities) the economic growth of the country remained slow for nearly half a century. Despite the uncertainty of the time and having limited financial resources, IEI played a pivotal role in spearheading the tasks of promoting science and practice of all branches of engineering. During this difficult journey, IEI maintained its association with IFAC for 35 years as its Indian NMO, but was forced to terminate its membership in 1994. After the liberalization initiative of the then Govt. of India with major successive devaluation of Indian currency during 1991-1993, it became unsustainable for IEI to pay the membership fee of IFAC, especially because it caters to all engineering fields in general and hence had to allocate its limited resources optimally. Being not an automatic control focused institute, IEI expressed its inability to contribute much to the objectives of IFAC and expressed its desire

to discontinue its membership through a formal letter dated 10-Jan-1994, which was subsequently approved by IFAC.

It can be mentioned here that IEI is still very much functional and vibrant in India, even though it is not more an NMO of IFAC. An interested reader can visit www.ieindia.org to have an idea about thelearn more about current activities of IEI.

Recent History:

In an interesting turn of events, around the time that IEI terminated its relationship with IFAC and a couple of years later, India's economic condition started improving, mainly because of the economic liberalization that started in early 1990s. Many technical conferences of international repute started appearing in India covering various disciplines of science and engineering. Increasing trends in application of controls and related technologies in aerospace, defence, manufacturing and process industries etc. also started taking place backed up by strong academic professionals and experts. However, the control community in India could not host any IFAC event because of the absence of an NMO of IFAC in the country. Because of this difficulty, the need for IFAC's presence was more strongly felt towards the end of 1990s. Hence, there were some attempts to revive the association of India with IFAC during 1998-2002 (including an attempt by the IEI itself in 1998), but those were unsuccessful. The status quo was maintained for nearly 15 years.

During 2009-2010 a strong necessity was felt across the country to bring the community working on "automatic control and dynamic optimization" topics together and project a focussed and unified group to the world through IFAC. After a few background work, a lot of action started in early 2011 and Automatic Control and Dynamic Optimization Society (ACDOS) got formally established on 08 July 2011. After following the required official procedures and necessary formalities, it was also approved to be the new NMO of IFAC in India in the General Assembly of IFAC on 29-Aug-2011. It officially got the status of NMO on 01-Jan-2012 after paying the necessary annual fee for the first time. Since then, ACDOS has been very active by nurturing and promoting the field of automatic control and dynamic optimization in academia and industry across India, hosting an international conference called Advances in Control and Optimization of Dynamical Systems (ACODS) biennially, hosting technical workshops at regular intervals, promoting close interaction between industry and academia etc. Within just five years of its inception, it has already hosted six IFAC events over last five years and many more are expected in the near future as well.

Method of Operation:

ACDOS is being managed by “Governing Council”, which consists of the President, three Vice-Presidents (one of whom serves as the president-elect), Immediate Past President, General Secretary, Joint Secretary and Treasurer. This group is ably supported by number of executive committee members as well. Annual General Meetings are done every year where all major decisions are taken. Elections are done once in two years. The society is formally registered with the Govt. of Karnataka, India, and has been recognized by government as a non-profit organisation. Currently ACDOS has about 200 members and has been able to establish a rapport for itself as a good professional society, which is serious in nurturing and promoting the field of automatic control in academia and industry.

Exemplar Contribution of the NMO to the work of IFAC:

During its long association with IFAC of 35 years during 1959-1994, the earlier Indian NMO IEI did four IFAC events in India, out of which three were in Delhi and one was in Bangalore. The events conducted during the early days include:

Systems Engineering Education in Developing Countries, during 04-07 Nov 1974 in Delhi

Computer Applications in Large Scale Power Systems, during 16-19 Aug 1979 in Delhi

Theory and Application of Digital Control, during 05-07 Jan 1982 in Delhi

Automation and Instrumentation for Power Plants,
during 15-17 December 1986 in Bangalore.

After ACDOS has been recognized as the NMO of IFAC in India in 2012, however, a number of IFAC events have been conducted over last four years, which include:

Workshop on Embedded Guidance, Navigation and Control, 13-15 February 2012, in Bangalore

Symposium on Computer Applications to Biotechnology, 16-18 December 2013, in Mumbai

Symposium on Dynamics and Control of Process Systems, 18-20 December 2013, in Mumbai

International Conference in Advances in Control and Optimization of Dynamical Systems, 13-15 March 2014, in Kanpur

Symposium on Control of Power and Energy Systems, 09-11 December 2015, in Delhi

International Conference in Advances in Control and Optimization of Dynamical Systems, 01-05 February 2016, in Tiruchirappalli

Besides conducting several IFAC events in quick succession, ACDOS has also been able to motivate as many as 24 professionals to become members of various Technical Committees of IFAC. Moreover, two of its office bearers are currently serving IFAC in the capacity of be-

ing the Chair of a TC and a member of the Council. As the awareness grows, it is expected that more and more members will contribute to the cause of IFAC in various capacities.

Bibliography:

More about ACDOS can be found at http://www.acdos.org

Office bearers of ACDOS (2014-2016) at the IFAC ACODS-2016 in Tiruchirappalli.

Photographs (from left-to-right) include: J. Barve (general secretary), Sk. F. Ali (joint secretary), R. Padhi (president), M. S. Bhat (immediate past-president), R. Gudi (vice-president) and R. Ayyagari (vice-president and president-elect). S. Mishra (vice-president) and S. N. Omkar (treasurer) are missing in the picture since they could not attend the conference.

NMO: Israeli Association for Automatic Control (IAAC)

Date Founded: Early 1960s

Early History: IAAC was founded in the early 60's by control engineers from a mix of academia, government and industry.

Method of Operation: IAAC is run by an Executive Council which includes members from academia and industry and is headed by a President. In addition to individual members of IAAC, IAAC is also directly supported by industrial companies.

Exemplar Contribution of the NMO to the work of IFAC: IAAC provides a comprehensive series of support for graduate students within the NMO. Since 2005, the previously occasional GSC -Graduate Students in Systems and Control workshop has been organised annually, where graduate students in systems and control from Israeli universities are invited to present their latest research results. These meetings provide an opportunity for the graduate students to present their work to senior faculty members and to interested delegates from industry, as well as get acquainted with each other's work. A graduate prize, the Velger Prize for Graduate Students in Systems and Control, was established in 2009 for the best presentation at GSC . As well as supporting graduate students to attend IAAC events, IAAC has a Student Travel Stipend program, IAAC-STS, to assist with registration, travel, and accommodation expenses for research graduate students in order to encourage the participation of graduate students from the Israeli NMO in appropriate research events held internationally.

Biography:

Velger Graduate Student Prize Ceremony (under the Auspices of the Israeli Association for Automatic Control and Elbit Systems Electro-Optics El-Op Ltd.) at the 6th IFAC Symposium on Robust Control Design. June 16 - 18, 2009, Haifa, Israel (ROCOND'09)

NMO: The National Research Council of Italy - Consiglio Nazionale delle Ricerche (CNR)

Date Founded: 1957

Early history: At the Automatic Control Congress held in Heidelberg in September 1956, a small group of enthusiastic scientists and engineers from different countries took the first steps towards setting up IFAC, by signing the famous resolution. A member of this group was the eminent Italian scholar Giuseppe Evangelisti, professor of Hydraulics at the University of Bologna. Following this event, in 1957 the National Research Council of Italy (CNR) set up the CNR Commission for IFAC, with the mission of supporting early initiatives for the promotion of IFAC in Italy. In the same year, Italy was one of 8 countries to officially join IFAC.

Method of Operation: IFAC activities promoted by the Italian community are coordinated by the NMO in conjunction with the Italian IFAC Officers. The various national associations dealing with automatic control are constantly consulted, in particular the Italian Society of Professors and Researcher in Automatica (SIDRA - Società Italiana Docenti e Ricercatori di Automatica).

Exemplar Contribution of the NMO to the work of IFAC:

1956 - 6 months prior the Heidelberg Congress, the CNR organized in Milano the celebrated Convegno Internazionale sui Problemi dell'Automatismo, one of the first major congresses in the area of control. It was held in Milano, with 1061 participants from more than 20 countries. The opening address is given by Gustavo Colonnetti, President of CNR in those days. This event can be seen as the Big Bang of control science in Italy.

1962 - In the period ranging from the 1st IFAC World Congress in Moscow (1960) to the subsequent congress of Basle (1963), Italy had the privilege to host the first IFAC symposium. Entitled Optimizing and Adaptive Control, it was held in Rome April 1962, with an opening address by Giovanni Polvani, president of the CNR in those days.

2002 - The Italy in IFAC booklet is published 2002.

2006 - The 50th anniversary of Control Science in Italy is celebrated with the second Convegno Internazionale sui Problemi dell'Automatismo, held in Milano.

2011 - The 18th IFAC World Congress is held in Milano, with a record number of participants.

1962 on: Overall Italy hosted more than 100 IFAC events.

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Italy in IFAC – From dawn to our days. Meregalli publisher, Milano, 2002.

Control Science Evolution. Proceedings of the Second Convegno Internazionale sui Problemi dell'Automatismo held in Milano in 2006, published by The National Research Council of Italy (Consiglio Nazionale delle Ricerche – CNR), 2008, Roma.

Control Science Evolution. Proceedings of the Second Convegno Internazionale sui Problemi dell'Automatismo held in Milano in 2006, published by The National Research Council of Italy (Consiglio Nazionale delle Ricerche – CNR), 2008, Roma.

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IFAC World Congress, Milano 2011, opening ceremony and a team of organizers

NMO: Institute of Control, Robotics and Systems (ICROS)

Date Founded: January 1989

Early History: The first conference devoted to the control engineering field in Korea was held in 1988. The conference was called the Korea Automatic Control Conference (KACC), and was jointly organized by the following five societies: Korean Society of Mechanical Engineers, Korean Institute of Electrical Engineers, Institute of Electronics Engineers of Korea, Korean Institute of Chemical Engineers, and Korean Society for Aeronautical and Space Sciences. The KACC hosted technical sessions in both English and Korean.

Shortly after the first conference, with the objective of increasing participation from academia, industry and research laboratories, the Korean Automatic Control Council was formed in 1990, which evolved into the Institute of Control, Automation and System Engineering (ICASE) in 1994. The difference between the two is that the latter is an official government-approved non-profit organization, which must satisfy certain government guidelines and requirements. The ICASE name was changed to the Institute of Control, Robotics and Systems (ICROS) in 2007.

Method of Operation: A noteworthy difference of ICROS in comparison to most other professional organizations is the fact that ICROS President is alternated between academia and industry. This reflects ICROS's emphasis on cooperating with industry.

Exemplar Contribution of the NMO to the work of IFAC: The KACC series was typically held in the summer and was continued until 2000. By that time, the number of control engineers in Korea grew, and the need to host biannual conference series was raised. Henceforth, the ICROS has hosted a Korean-language conference series called the ICROS Conference in the spring and an English-language conference series called the International Conference on Control and Systems (ICCAS) in the fall of each year since 2001.

The ICROS has also actively pursued cooperating with counterpart international organizations. Most remarkably, ICROS became an IFAC NMO in January 1989, and its bid to host an IFAC World Congress was successfully presented at the 1998 IFAC Council Meeting. Eventually, the 17th IFAC World Congress was held in Seoul in 2008, with Wook Hyun Kwon as the IFAC President, Hyungsuck Cho as the General Chair, Dong-Il "Dan" Cho as the Program Chair, and Shinji Hara as Program Co-Chair. The Congress was attended by 2,741 researchers from 69 countries, and 2,702 papers were presented. Both numbers reflect the largest in IFAC history to that time. ICROS also has partnership agreements with many foreign counterpart organizations, including Japan's Society of Instrument and Control Engineers (SICE) since 1997, IEEE Robotics and Automation Society (RAS) since 2000, and Chi-

nese Automatic Control Society (CACS) since 2000.

Control, robotics and systems engineering in Korea has been very robust, steadily growing since 1988, and ICROS hopes to continue growing with partner organizations around the world.

Opening ceremony of the inaugural International Conference on Control, Automation and Systems in Korea

NMO: IFAC-LINO

Date Founded: 1997

Early History: Lithuanian scientists have worked in the field of Automatic Control for quite a long period. The former Soviet Union National Automatic Control Committee had its Lithuanian branch related to Lithuanian Academy of Sciences since 1970. Lithuanian scientists attended both the IFAC World Congresses and the all-union meetings held by Academy of Sciences of the former Soviet Union.

After regaining the independence in 1990, Lithuania started to cooperate with the Department of Computer Science in Mechanical Engineering - jointly with the Centre for Research and Development in Higher Education (HDZ/IMA) - University of Technology (RWTH) Aachen within the IFAC Committee on Social Impact of Automation activities and East Meets West programme.

The NMO: The Lithuanian National Committee for IFAC was formed in 1996 and became the IFAC Lithuanian National Organization (IFAC-LINO) in 1997.

Method of Operation: IFAC-LINO includes members from academia and industry. It furthers the development of control technologies in Lithuania, strengthens the understanding and initiates cooperation among scientists, researchers and users in in the field.

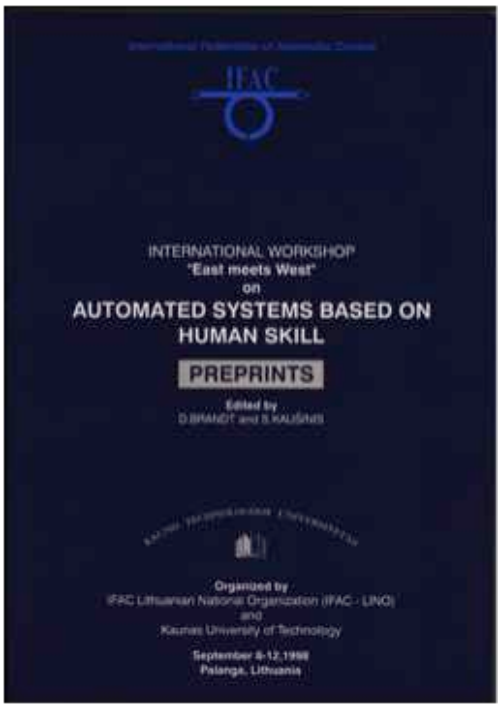
Exemplar Contribution of the NMO to the work of IFAC: The 3rd International Workshop “East meets West” took place at Palanga, Lithuania, Sept. 8-12, 1998. The event was jointly organized by the IFAC TC on Social Impact of Automation and the NMO of Lithuania.

The workshop was specifically supported by the Lithuanian Government as well as by prestigious universities, the Vytautes Magnus University, Kaunas, and Kaunas University of Technology.

54 representatives from university, industry and politics attended the workshop, 22 papers were presented on Sept. 9/10, 1998.

The main area of concern at the workshop was to analyze how the joint efforts of university, industry and politics in industrial automation and control can support the country's difficult transition into today's technological world.

Furthermore recent developments of humanization of work and of environmental technology in the U.K. and Germany were compared with the achievements and needs of these “Eastern” countries.



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International workshop “East meets West” on Automated Systems Based on Human Skill. Preprints Kaunas University of Technology, 1998, p. 81.

NMO: Norwegian Society of Automatic Control (NFA)

Date Founded: 10. October 1958

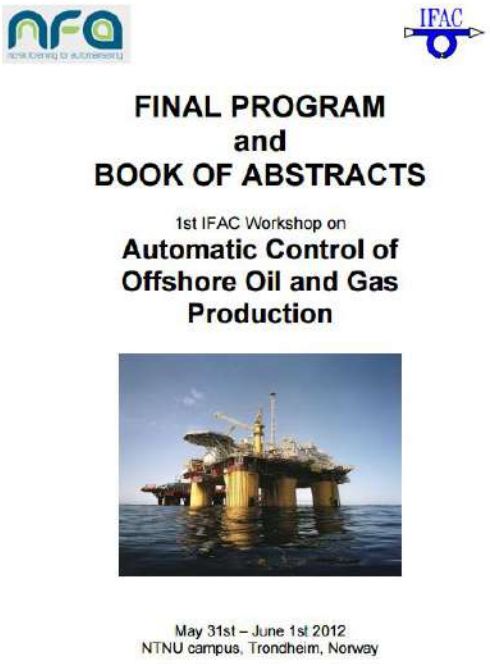
Early History: NFA was founded to ensure good cooperation between the industry, production companies, research institutes and academia. In this period the interest for industrial automation in Norway was growing rapidly. Norway was in the infancy when it comes to use of automated solutions in the industry, and the founders of the NFA visited international conferences and universities to learn more about the subject and the use of technology. Several of these enthusiasts have subsequently been involved and contributed to the technological development of the Norwegian industry.

Method of Operation: A secretariat headed by a Managing Director is governing NFA. The Managing Director reports to a board consisting of members from academia and the industry. Individual members in addition to industrial companies, research institutes and educational institutions are members and support NFA.

Exemplar Contribution of the NMO to the work of IFAC: NFA has made great contributions to the dissemination of the practice of control engineering, achieving significant impact nationally, but also internationally. The IFAC Symposium on the Computer Application in Shipping, Ship Buildings and Offshore Operations in 1973 was the first of several IFAC arrangements held in Norway. After which it was organized series of arrangements different places in Norway.

Automation in Offshore Oilfield Operation in 1976, Automation for Safety in Shipping and Offshore Petroleum Operations (ASSOPO-80) in 1980, Automation for Safety in Shipping and Offshore Petroleum Operations (ASSOPO-85) in 1985, Automation and Data Processing in Aquaculture in 1986, Computer Software Structures Integrating AI/KBS Systems in Process Control in Bergen 29.05.- 30.05. 1991. IFAC SafeComp in Trondheim 30.10.- 01.11. 1991, Automatic Control in Offshore Oil and Gas Production in 2012 and in 2016 DYCOPS and CAMS.

NFA also provides support to students graduating from colleges and universities in Norway. A graduate prize for the best master thesis awarded to students studying technical cybernetics/automatic control. NFA also provide scholarships to students studying automatic control.



The First IFAC Workshop on Automatic Control of Offshore Oil and Gas Production was held in Norway in 2012

NMO: POLISH SOCIETY FOR MEASUREMENT, AUTOMATIC CONTROL AND ROBOTICS

Date Founded: 1957 (change of the name in 1981)

Early History: After World War II there has been a rapid development of automation, robotics and metrology, and an increased social role and status of these scientific disciplines. There were created numerous international organizations, associations and federations in the world, whose job was custody over comprehensive development of these areas, both in science and in practice. In many countries they organized personnel both for training process engineers and educating youth at university level. Also in Poland it was acknowledged that it was necessary to give an organizational framework for educational activities and research carried out in the field of automation, robotics and metrology.

In 1957 initiated by a few scientific and technological associations of the Chief Technical Organization (NOT), in cooperation with the Polish Academy of Sciences (PAN), established (within the framework of the NOT) the Polish Committee for Automation, being the first Polish organization whose activities were entirely devoted to this new area of knowledge. According to the emerging new challenges and needs, the name and organizational structure of this committee respectively evolved and accordingly expanded the scope of its interests. In 1960 the committee was first transformed into the Polish Committee for Measurement and Automation, which operated until 1982. In later years, also in the structure of Chief Technical Organization, functioned committees with names: Polish Scientific and Technical Committee for the affairs of Measurement and Automation (1983-1987) and the Polish Committee for Measurement, Control and Robotics (PKPAiR, 1988-1991).

On May 10, 1991 General Assembly of Delegates of Engineering Associations of the Chief Technical Organization (NOT) adopted Resolution No. 15, in which it was decided to liquidate PKPAiR and to provide assistance in establishing in its place a scientific and technical association. The Polish Association for Measurement, Control and Robotics (POLSPAR), established by a group of founders, was registered by the Regional Court in Warsaw on 12 December 1991. The first General Assembly of the Association, which was held on 16 March 1992, laid the foundations of POLSPAR, enacted its statute and selected its authorities.

Yet in the early twenty-first century the structure of the Association included three statutory committees: Committees for Automation, Robotics Committee, and Measurement Committee. At the initiative of prof. Zdzislaw Kowalczuk in 2010, changes were made to the Statute of the Polish Association for Measurement, Control and Robotics (POLSPAR), involving the opening of the Association's structure for new committees, and the extension of its scope of

interests to the domain of PARIT, covering, apart from the disciplines of measurement, automation and robotics, also the area of modern information technology.

After sanctioning these changes, the General Assembly of POLSPAR, which was held on 16 December 2011, appointed a new committee - the Committee for Thermography and Infrared Thermometry. The number of regular members exceeded 200.

The Association POLSPAR activated (revitalized) cooperation with several international scientific and professional organizations, including the IFAC (International Federation of Automatic Control) and IMEKO (International Measurement Confederation), delegated their representatives to technical committees of these organizations and co-organized numerous international seminars, symposia and conferences.

At the time of the IFAC Congress 2014 held in Cape Town (South Africa), the IFAC authorities honored their past presidents with commemorative posters. Among them was Professor Pawel Nowacki the IFAC President and the Polish co-founder of IFAC.

The Association of POLSPAR also conducts extensive publishing activities, primarily through the monthly “Measurement Automation Inspection” (PAK), which became a publishing organ of POLSPAR, and currently changed its language of publication to the English and its name to the “Measurement Automation and Monitoring” (MAM). POLSPAR also co-operates with other magazines, such as the “Measurement Automation and Robotics”(PAR) and the “Journal of Automation, Mobile Robotics & Intelligent Systems”(JAMRIS), as well as with the publication houses of PAK-SIMPRESS and PWNT.

In its recent history the Association, under the name POLSPAR, evolved under the leadership of the four consecutive presidents:

1. PhD Jan Bek (1992-1998)

2. Prof. Tadeusz Puchałka (1998-2004)

3. Prof. Wieslaw Winiecki (2004-2011)

4. Prof. Zdzislaw Kowalczuk (Since 2011)

Method of Operation: IFAC activities in Poland are solely coordinated by POLSPAR, the Polish Association for Measurement, Control and Robotics. The official NMO, POLSPAR, is a national association having a broad scope, spanning from electrical and electronic engineering, measurements, automatic control, robotics, and computer science and different IT domains.

At this moment, the Polish Association of Measurement, Control and Robotics (POLSPAR) has over 200 members, mostly from science and industry. The Association consists of four

committees: Automation Committee, Measurement Committee, Robotics Committee and the Committee of Thermography and Infrared Thermometry. Committees include specialty sections. The chief executive body of the Association is the Board of Directors. Very important role is played by the Association supporting members, who are play a key role in maintaining the financial autonomy of POLSPAR.

POLSPAR has been for many years a member of the international organization IFAC, IFR and IMEKO. POLSPAR closely collaborates with the magazine Measurement, Automation, and Monotiring (MAM, formarly PAK), which is the main publishing body for the Association.

Exemplar Contribution of the NMO to the work of IFAC:

Professor Pawel Nowacki the IFAC President and the Polish co-founder of IFAC participation in digitalization of documents for the electronic library of IFAC conference materials in Laxenburg with respect to the proceedings of the IV IFAC World Congress in Warsaw 1969, hosting tens of IFAC events, including the 1969 World Congresses, examplary recent POLSPAR scientific events:

10th Int. Workshop on Robot Motion and Control, 2015 (IFAC)

12th Int. Conf. on Diagnostics of Processes and Systems, DPS, 2015 (POLSPAR, PAN)

13th Int. Conf. on Programmable Devices and Embedded Systems, PDES, 2015 (IFAC)

19th Int. Conf. on Methods and Models in Automation and Robotics, 2014 (IEEE)

13th Int. IMEKO TC10 Workshop on Technical Diagnostics, 2014 (IMEKO)

9th Int. Workshop on Robot Motion and Control, 2013 (IFAC)

18th Int. Conf. on Methods and Models in Automation and Robotics, 2013 (IEEE)

16th French-German-Polish Conference on Optimization, 2013

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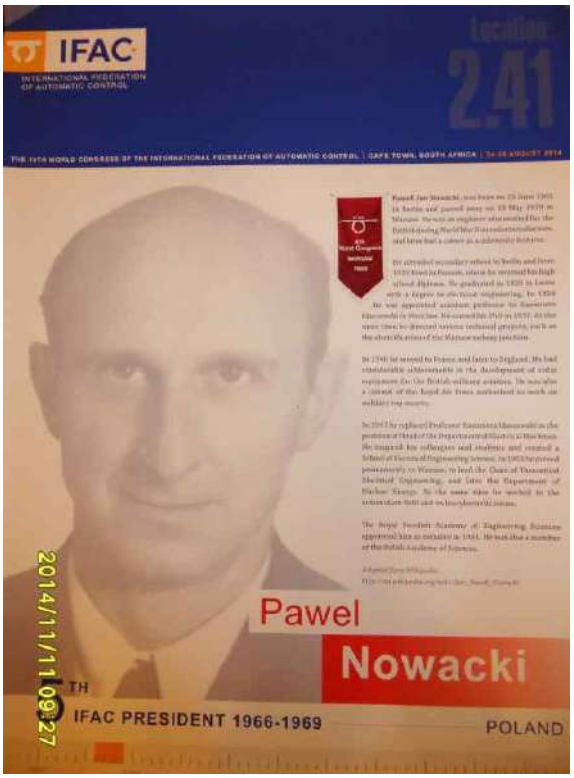

Pawel Nowacki, President of IFAC

Medal of the Association of Polish Electrical Engineers (a sister association of NOT)

NMO: RUSSIAN NATIONAL COMMITTEE on AUTOMATIC CONTROL

Date Founded: 1956

First as USSR NATIONAL COMMITTEE on AUTOMATIC CONTROL

Since 1991 official inheritor as RUSSIAN NATIONAL COMMITTEE on AUTOMATIC CONTROL

Early History: Since the 1930's the research and engineering in the field of Automatic Control acquired a broad attention in USSR, being mostly concentrated around the Institute of Automatics and Telemechanics (IAT) in Moscow, with several National Conferences convened before 1956, when a delegation of USSR was present in Heidelberg at the Conference on "Regelungstechnik –Moderne Theorie und ihre Verwedlarkeit". This was where it was decided to organize IFAC under its first President H.Chestnut (USA) and to have its First World Congress in Moscow USSR (27/06 – 07/07, 1960) presided by A.M.Letov. The USSR National Committee on Automatic Control (NKAU) was officially registered as an organization within the Academy of Sciences of the USSR. Its first Chairman was Academician V.A. Trapeznikov, the Director of IAT (now known as IPU – the Institute of Control Problems). Such committee operated under this title throughout the existence of USSR, till 1991. Since then it acquired its present title of Russian National Committee on Automatic Control (also NKAU) – an official inheritor, which is still an organization now in the Russian Academy of Sciences.

Method of Operation:

AT PRESENT the Russian IFAC NMO is organised through Territorial Groups

These are in Moscow , St.Petersburg (the most active group), FarEast (Vladivostok), Siberia (Irkutsk), Volga river(Samara), Urals (Yekaterinburg), South Russia and North Caucasus (Rostov on the Don river). They promote IFAC topics in their regions.

Historically in the USSR:

It turned out that many of the Union's national Soviet Socialist Republics had formed their own sub–committees of NKAU type. These enhanced control research and education in their regions. Throughout 1960-1991, at every year that preceded the one for an IFAC World Congress, there was convened an All-Union Meeting on Problems of Control, hosted by Russian Federation or one of the national Republics. These meetings were very well attended, exceeding one thousand participants and more. They summarized research and engineering achievements and selected papers to be submitted to the IPC of the forthcoming IFAC World Congress. The Soviet delegation at such Congresses always consisted of participants from

several Republics including Russia. Between 1960 and 1991 there were 19 IFAC meetings in such places as Alma-Ata (Kazakhstan), Baku (Azerbaidjan) , Kiev (Ukraine), Minsk (Byelorussia, Riga (Latvia), Tbilisi (Georgia), Tsakhadzor (Armenia), Vilnius(Lithuania) and at various sites in Russia, including Sochi and Suzdal. The topics ranged from Aerospace , Finite Automata, Adaptive and Stochastic Control, Identification to Control Design, Manufacturing, Differential Dynamic Games and Business Games. In 1990 there was an IFAC World Congress in Tallin, Estonia, then USSR (13-17/08).

First IFAC World Congress in Moscow

The total number of meetings in USSR (1960 – 1990) was 20, in Russia (1991-2015) was 17.

After 1991 two now independent states: Ukraine and Byelorussia pursued membership in IFAC. The second of these later had to resign.

At present: After 1991 and some restructuring the IFAC events continued in Russia – in Moscow, St.Petersburg (former Leningrad) and such distant places as Vladivostok on the Pacific Coast, Irkutsk near lake Baikal in East Siberia, Chelyabinsk in the Urals, Samara and Nizhniy Novgorod on the Volga river. The topics ranged from Nonsmooth Optimization and Discontinuity in Control (in 1991, 1998), Navigation and Control in Aerospace, NOLCOS, Logic Controlled Dynamics to Structural Control , Control Education and Control in Manu-

facturing, Periodic Systems and Modeling, Identification for Nonlinear Systems (MICNON in 2015).

There are actually also two national research meetings a year that are formally beyond IFAC, but are run by IFAC activists.

Apart from the mentioned meetings a significant activity on IFAC topics is concentrated at research seminars and graduate studies.

Exemplar Contribution of the NMO to the work of IFAC:

Organizing significant IFAC Symposiums Nolcos (2001, Aerospace (2006), Information and Control in Manufacturing (2009) , Control Education (2012) and MICNON(2015) (actually a symposium).

Russian representatives are members of the IFAC Council

There are 32 Russian representatives in 21 IFAC Technical Committees

NMO: Otomatik Kontrol Türk Milli Komitesi-TOK

(Turkish National Committee of Automatic Control-TOK)

Date Founded: 18 May 1958

Early History: Turkey was one of the countries represented by a delegate at the "Constitutive Assembly" convened in Paris on 12 September 1957. Approximately 5 months later on 18 May 1958, in the Istanbul Technical University under the leadership of Prof. M. Münir Ülgür and Prof. Mehmet Nimet Özdaş an institute at IFAC status by the name "Türk Otomatik Kontrol Kurumu-TOK" (Turkish Automatic Control Institute) was established as IFAC NMO. Prof. Mehmet Nimet Özdaş, one of the founders of TOK, served as a member of the IFAC Executive Council in the period 1972-1973. Some years later on 02 May 1990 the name of the IFAC NMO was changed by a legal action and the new name was accepted to be "Otomatik Kontrol Türk Milli Komitesi-TOK" and the regulations and by-laws were updated at the same time.

Method of Operation: The IFAC activities in Turkey are coordinated by TOK. The members of TOK, which constitute the General Assembly, are academicians, researchers and industrial companies working on various topics of automatic control. TOK is managed by an administrative board, elected by the General Assembly for a 3- year period.

Exemplar Contribution of the NMO to the Work of IFAC: TOK has hosted various International IFAC conferences and workshops. TOK is holding on a yearly basis a National Automatic Control Conference with local industrial participation at a different university in Turkey, thus aiming to disseminate throughout the country knowledge of automatic control and present the latest industrial applications. In 1998 TOK has celebrated its 40th anniversary and in 2008 its 50th anniversary by organizing special National Conferences with international participation where the IFAC Presidents – past and current at the time- were the guests of honour. TOK is intensively working to bring the IFAC World Congress to Turkey.

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NMO: Ukraine Association of Automatic Control (UAAC)

Date Founded: Middle 1992

Early History: UAAC was founded in 1992 after disintegration of the Soviet Union and Ukraine independency. UAAC founders were scientists from Ukraine Academia of Sciences, Universities and institutes, specialists from industry. Space Research Institute of National Academy of Sciences of Ukraine and State Space Agency of Ukraine had become headquarter of the UAAC.

Method of Operation: UAAC is governed and coordinated by National Committee (NC) elected on the first constituent assembly and then every three year it is re-elected. NC chairman is at the same time head of UAAC. Vice-chairman and Scientific Secretary of NC help chairman to contact with Ukrainian officials, IFAC staff and regions of Ukraine. Each NC member presents one of Ukrainian region where individual members of UAAC permanently live and work. They directly contact with ordinary UAAC members and inform them about all events in UAAC and IFAC. Besides they are chairmen of local organizing Committee of UAAC conferences and other events that conducted in their region. Every year International conferences under the title “Automatica-year” are conducted in one of Ukrainian region usually on the base of Polytechnical or Technological Universities. Many foreign scientists from Russian, Poland, Spain, USA and other have been invited to take part in these conferences. NC helps young scientists to move forward and carry out researches in control and information sciences providing them conditions to defence PhD dissertations successfully.

Exemplar Contribution of the NMO to the work of IFAC: UAAC and NC members assist Ukrainian specialists and scientists especially young to prepare and to submit reports to different IFAC events, consult them in financial affaire and travel. To spread among individual UAAC members News letters and other materials about IFAC activity.

NMO: United Kingdom Automatic Control Council (UKACC)

Date Founded: 1958

Early History: UKACC was originally known as the UK Automation Council (UKAC) and was formed to bring together the interests of a large number of parties in automation and control in the UK to become the National Member Organisation (NMO) of the then newly formed IFAC, which required an NMO to represent all the interests across automatic control for any nation wishing to host their events.

Method of Operation: UKAC initially had a large representation on its executive which included not only professional engineering institutions but also influential trade union and government representations. Initially the secretariat for UKAC was held by the Institution of Electrical Engineers (IEE) before it moved to the Society of Instrument Technology (SIT), which became The Institute of Measurement and Control (InstMC) in 1968. In the 1990's the secretariat of the then renamed UKACC returned to the IEE, now the Institution of Engineering and Technology (IET) before finally returning to the InstMC. In order to better engage with the control community in the UK in its widest sense, UKACC recently changed its constitution, where the most significant changes related to membership categories and rights. Within the current constitution, any organization or group deemed by the Executive Committee to have an interest in or an association with control engineering and related disciplines may become a member of UKACC. There are three classes of membership for which different annual membership fees apply: a) Corporate Membership: This class of membership is ascribed to organizations with a strong interest in automatic control and the activities of UKACC, normally (but not exclusively) the professional engineering institutions. Corporate Members pay the corporate subscription rate, are entitled to two representatives and one observer on the UKACC Executive Committee, with full voting rights. Currently, the three Corporate Member bodies are: The Institute of Measurement and Control, The Institution of Engineering and Technology and The Institution of Mechanical Engineers. b) Group Membership: This class of membership is ascribed to groups within organizations that have interest in automatic control and the activities of UKACC. Group Members pay a reduced subscription rate compared with Corporate Members and each is entitled to make one nomination for election to the UKACC Executive Committee and to vote for up to six candidates in the election for those Group Member Representatives that sit on the Executive Committee. c) Individual Membership: This class of membership is ascribed to individuals with an interest in automatic control and the activities of UKACC and they will be entitled to attend the AGM. Individual members have one vote in the election process for Executive Committee membership but cannot nominate candidates.

Exemplar Contribution of the NMO to the work of IFAC: A highlight in the early years for the UK NMO was hosting of the third IFAC World Congress in London in 1966. HRH the Duke of Edinburgh (the husband of Queen Elizabeth II, was Patron for the event, the late Professor John Coales was the IFAC President and Professor John Westcott was chair of the International Programme Committee. The Prime Minister, Harold Wilson, attended and spoke at the Congress banquet. UKACC organizes a successful biennial conference series, with the first in the series under the auspices of UKACC taking place in 1996. The next in the series takes place at Belfast in 2016. UKACC runs a number of other activities including its annual UKACC Lecture and a regular series of postgraduate student workshops.

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The London Congress 1966 where HRH Prince Philip, a great ambassador for engineering in the UK, was patron.

NMO: American Automatic Control Council (AACC)

Date Founded: 1957

Early History: One of the founding principles of IFAC was that there would be a single National Member Organization (NMO) from each member country who would be the formal member of IFAC. These NMOs had to reflect the interests of control engineers across all disciplines in that country. Although several professional societies were involved in control activities, there was no single organization in the U.S. at that time devoted to control across all engineering disciplines. The American Automatic Control Council (AACC) was thus created with Rufus Oldenburger as its first President to enable the US to join IFAC.

Method of Operation: AACC is an association of the control systems divisions of its member societies, currently numbering nine: AIAA, AIChE, APS, ASCE, ASME, IEEE, ISA, SCS, and SIAM. The principal activity of AACC is the organization of the American Control Conference. The conference typically attracts about 1,400 international participants and features about 1,000 refereed papers. AACC also established several annual awards to recognize and honor individuals who have made significant contributions to both control theory and practice. AACC also helps to promote and arrange for IFAC events in the U.S. and provides delegates for IFAC committees and leadership. For more information please visit www.a2c2.org.

Exemplar Contribution of the NMO to the work of IFAC: The AACC cosponsors the "Beauty of Controls" workshops for middle and high school teachers and students, which held its 15th event during the 2015 ACC in Chicago. The U.S. NMO initiated and developed these workshops, which are held twice a year in conjunction with the ACC, CDC and IFAC Meetings and Congresses. One objective is to attract the most gifted young people to the profession. The workshop activities include short and inspirational presentations by experts, informal discussions, hands-on activities, and the opportunity for teachers to meet passionate

leaders from academe and industry. Another objective is to enhance the public image and understanding of automatic control to outsiders. Associated sessions provide a forum for dialogue focused on innovative methods of presenting information to students who are considering careers in science and engineering. During the past 15 years, over 7,000 middle and high school students and their teachers participated with undergraduate students and over 150 leaders from both control research and application communities.

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NMO Name: South African Council for Automation and Control (SACAC)

History of SACAC and IFAC in South Africa

Brief of this document and its approach.

The South African Council for Automation and Control (SACAC) has been the South African National Member Organisation (NMO) for the International Federation of Automatic Control (IFAC) since its inception in 1961. Historical accounts face a danger of being a non-interactive series of facts and events, when in fact these facts and events are the result of role players involved therein. This historical narrative thus attempts to be non subjective yet also highlight the key personalities that have contributed to SACAC since its inception. Even this very document is heavily if not totally indebted to a more detailed SACAC annuls documentation briefing SACACs activities from 1961 to 2005 by Ian Craig.

Upon acceptance of the IFAC constitution in September of 1957 in Paris one of IFAC's first initiatives was to invite various countries to affiliate via appropriate NMOs. A series of events led to IFAC's affiliation invitation being passed to Dr Otto Brune a principal researcher at South Africa's Council for Scientific and Industrial Research. A meeting on 1 February 1961 chaired by Prof Guerino Bozzoli involved a number of similarly interested bodies including South African Institutes of Electrical, Mechanical and Civil Engineering as well as the Instrument and Control Society of South Africa. It positively agreed to form a separate body to adequately represent the activities and interest of the automatic control field in South Africa and in turn be the NMO to IFAC. Consequently on 29 August 1961 the South African Council for Automation and Computation (SACAC) was formed and its constitution adopted with Dr Otto Walter Heinrich Oscar Brune as first president.

SACAC goals from conception has been to maintain a formal association with IFAC, organising and participating in IFAC events and facilitating contact amongst researchers, practitioners, users and suppliers of automation technology. Membership is by corporate and institution membership rather than individual membership. Over the years membership has grown to 50 corporate and institutional members representing South Africa's leading corporate, educational institutions, research organisations and private companies in the field of automatic control. As stated in its constitution SACAC's key goal is to promote the science and practice of automation and control for the benefit and economic prosperity of the people South Africa.

SACAC has grown from its founding fathers historical phase through to its current guiding elders phase with minor name changes to reflect its current focus and name South African Council for Automation and Control. Otto Brune from his MIT dissertation notably laid the

mathematical foundation for realisation theory as later applied to synthesis of passive networks in electrical circuit theory. He as a notable researcher was first president of SACAC. Dave Hulbert another notable researcher is responsible for numerous world firsts in the field of milling and flotation control and the development of associated sensing technologies. Typical approaches are Cynoprobe, Hydrocyclone Underflow Meter, Particle Size Estimator, Flotation Level Stabiliser and the Expert Online Technology. Yet Dave still found time to be a very active in SACAC over and above being a member of the editorial board of Control Engineering Practice through the 1990s and well into this century.

Another key SACAC personality is David Jacobson who is a prominent control scholar having been a assistant then associate Harvard University professor of Applied Mathematics in the 1970s before coming back to South Africa to be a professor in Applied Mathematics and a well established high profile manager in industry. Through two decades, 70s and 80s, he was a member of the IFAC Theory Committee, Automatica editorial board member, IFAC Mathematics of Control Committee member, and charter member of the IFAC Working Group on Control Applications of Nonlinear Programming. Uolevi Luoto, IFAC president from 1975-1978, has a South African connection. He worked as an electrical engineer at the South African CSIR for a four year period commencing in 1952. Uolevi was a founding member and past president of the Finnish Society of Automatic Control and the Finnish Nuclear Society.

Ian Macleod was a key academic in supervising a number of control scholars and practitioners. About 20 PhD students passed through his hands and numerous MSc students, five of whom became professors and senior academics. An IFAC president, an IFAC World Congress IPC Chair, a number of SACAC presidents including the current president are among his past students. He was also a TC Chair for the IFAC TC on Distributed Computer Control Systems from 1993-1999, Chair of the IPC for the 1997 IFAC Workshop on Distributed Computer Control Systems, Seoul Korea, Member of the IFAC TC on Computers from 1987-1992. He edited two volumes on distributed computer control systems, authored about 100 technical publications, was editor of the Transactions of the South African Institute of Electrical Engineers (control engineering) and he was also the associate editor for three international journals.

Mike Rodd is a past SACAC president and is a recipient of the IFAC Outstanding Service Award in 1996. He was also Editor-in-Chief of IFAC Journal Control Engineering Practice from 1993 to 1998, was vice-chair of the IFAC Technical Board from 1990 to 1993 and served as chairs of IFACs Computers TC and Distributed Computer Control Systems working group. Gunter Sommer similarly a past SACAC president is a twice recipient of IFAC Applications Committee Outstanding Service Award and chair of the IFAC Working Group on Mining, Mineral and Metal Processing among other IFAC and SACAC accomplishments. Naude van Wyk was the first recipient of the SACAC Life-time Achievement Award and a sample of his

IFAC accomplishments include IFAC Outstanding Service Award, Vice-chair of the IFAC TC DECOM, Council member, Chair of Policy Committee, Vice-chair of IFAC Technical Board, and also Chair of the IFAC TC on Computers. His work covering a period of over forty years.

South Africa is a mineral rich country and as such SACAC has hosted a number of IFAC events for this field. These include the IFAC Symposia Automation in Mining, Mineral and Metal Processing in 1976, 1995, 2010. Other IFAC Symposia and Conferences are Automatic Control in Power Generation, Distribution and Protection in 1980, Workshop on Distributed Computer Control Systems in 1983, SOCOCO in 1988, Workshop on Applied Measurements in Mineral and Metallurgical Processing in 1988, DECOM-TT in 2000, African Control Conference in 2003, NOLCOS in 2007.

No doubt SACAC's main IFAC highlights have been at the World Congresses hosting friendship and related evenings at the 1999 Beijing Congress, 2002 Barcelona Congress, through 2005, 2008 to 2011 in Milan. This culminated in the first World Congress in Africa in Cape Town for the 2014 World Congress.

SACAC continues to annually host a number of workshops and tutorials especially targeting its local industry members as part of its objectives. Much of this is due to the dedicated members that SACAC has. One such member whom justice would not be served if he were not highlighted is Prof Ian Craig the IFAC immediate past-president. Much of SACAC's history as noted at the beginning is intertwined with its members. On the 29th of August 2011, exactly 50 years to the day, from the establishment of SACAC Ian Craig was elected as IFAC's 20th President. On the 29th of August 2014, 54 years from SACAC's establishment again to the day, Ian Craig was closing off the first World Congress to be held on African soil. Both these events are key highlights in SACAC's and indeed IFAC's history. Ian Craig currently helps to guide SACAC and this organization is truly indebted to his dedication and passion for SACAC. Even this report is greatly influenced if not totally based on much of his contributed documents. He has also served in numerous capacities with in IFAC and been duly awarded. SACAC continues in its mission to passionately serve the control and automation fields in Africa and history will show the results of this passion in the increased participation of more African countries in IFAC.

Postscript

This concludes the first edition of The IFAC Story. Since it is a Living Document it is planned that at the end of each triennial period new materials will be added to this edition, which will include the summaries of the three annual Council Meetings as well as the World Congress, and any information the National Member Organizations will share.

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I F A C

INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

Constitution and By-Laws
as adopted by the General Assembly
at Chicago, September 17, 1959.

C O N S T I T U T I O N

SECTION 1 - GENERAL PROVISIONS

Article 1

(a) The organization is to be called "International Federation of Automatic Control" - abbreviated IFAC.

(b) The Federation, which does not exercise any activity with economic aims, adopts the legal form of an association in accordance with paragraph 60 and further of the Code Civil Suisse, as long as it is not contradictory to the present Constitution.

(c) The seat of IFAC shall be determined by the General Assembly.

Article 2

(a) The purpose of the Federation is to promote the science of automatic control.

(b) For the purposes of this Constitution, automatic control is deemed to cover the field of open and closed loop (feedback) control of physical systems in theoretical and applied aspects.

Article 3

IFAC is to promote the science of automatic control by:

1) The interchange and circulation of information on automatic control activities in cooperation with national and other international organizations;
2) International congresses;
3) Such other means as may be considered desirable, as for instance, publications.

Article 4

With the approval of the General Assembly IFAC may join international organizations whose wider aims, or part of them, implicitly include those of IFAC.

SECTION 2 - MEMBERS

Article 5

For each country one scientific or professional engineering organization or one council formed by two or more such organizations having an interest in the field of automatic control shall be eligible for membership of IFAC.

Article 6

(a) Each application for membership of IFAC shall be addressed to the Executive Council.

(b) The Executive Council, having ascertained that the application corresponds to the regulations of Article 5, will submit the application for membership to the General Assembly which will authorize the admission on a simple majority of votes cast.

(c) Admission includes the obligation to recognize and adhere to this Constitution.

Article 7

(a) Membership may be terminated by a vote of the General Assembly if a member is one year in arrears in payment of its subscription, but such termination shall not relieve a member of the obligation to pay the subscription in arrear.

(b) A member organization not being in arrears in payment of its subscription may terminate its membership by delivering a declaration to that effect to the President or to the Secretary prior to July 1st in order to become effective at the end of the current year.

SECTION 3 - GENERAL ASSEMBLY

Article 8

The General Assembly is the supreme body of the Federation.

Article 9

The General Assembly shall consist of delegations of the member organizations, each member organization being entitled to one vote.

Article 10

(a) The General Assembly may be convened either as an ordinary or an extraordinary session.

(b) An ordinary session of the General Assembly takes place at such intervals as fixed in the By-Laws and possibly at an international congress convened by IFAC.

(c) An extraordinary session of the General Assembly may take place at any other time decided upon by the Executive Council. The Executive Council is furthermore obliged to convene one upon request of at least ten member organizations.

Article 11

Each member organization may authorize another member organization to vote in its place at a meeting of the General Assembly.

Article 12

At a meeting of the General Assembly, delegations shall be present from at least thirty percent of the member organizations to constitute a quorum for the transaction of business.

Article 13

Except for amendments to the Constitution, decisions of the General Assembly will become valid if supported by a simple majority of votes cast.

Article 14

(a) If any decision is required between meetings of the General Assembly, a postal ballot may be held and the decision taken on a simple majority of votes cast, provided that at least thirty percent of the member organizations have voted.

(b) Such a decision will be considered as having been reached by the General Assembly.

Article 15

In all cases of equality of votes cast on a simple majority vote, the decision is left to the chairman of the meeting or, in the case of postal ballot, to the President of IFAC.

Article 16

The President of the Federation, or, in his absence, one of the Vice-Presidents or, if there be no Vice-President present, another member of the Executive Council authorized by the President or failing him by the Executive Council shall preside at the meeting of the General Assembly, and in case of an equal vote shall have a casting vote.

SECTION 4 - LANGUAGES

Article 17

(a) The four official languages of IFAC shall be English, French, German and Russian.

(b) They may be used for discussions at the General Assembly, for the translation of official decisions taken by the General Assembly and for correspondence.

(c) The official record of any decisions of the General Assembly shall be in English.

SECTION 5 - EXECUTIVE COUNCIL

Article 18

(a) The management of the Federation shall be vested in an Executive Council consisting of the President, the First and Second Vice-Presidents, the Treasurer, six Ordinary Members and the immediate Past President who shall serve in the Executive Council with a right to vote until his successor vacates the Presidency.

(b) All members of the Executive Council shall be elected by the General Assembly and shall be unpaid.

(c) The members of the Executive Council shall serve in a personal capacity.

Article 19

The Executive Council shall be as widely representative as possible and in particular each Ordinary Member shall be from a different member organization of IFAC.

Article 20

(a) The President will legally represent the Federation.

(b) The President will only vote at meetings of the Executive Council and of the General Assembly in order to break a tie.

Article 21

(a) If the President resigns or cannot serve, the First Vice-President or, failing him, the Second or, if neither Vice-President can serve, a member of the Executive Council selected by the Executive Council, will temporarily serve in his place for such period as may be decided by the Executive Council.

(b) The person serving temporarily as President is to have the President's rights, privileges, responsibilities, and disabilities.

Article 22

The Treasurer shall generally supervise the financial activities of IFAC.

Article 23

(a) The Executive Council shall appoint a secretary who shall keep and publish minutes of the meetings, send out announcements of meetings and carry on correspondence, and shall be responsible for the postal ballots.

(b) The Secretary shall not have the right to vote in the Executive Council.

Article 24

The Executive Council may appoint an editor to supervise the publications of IFAC who shall not have the right to vote.

Article 25

All provisions concerning voting are set forth in the By-Laws.

Article 26

(a) The election of the members of the Executive Council by the General Assembly shall take place on a simple majority of votes cast.

(b) A candidate for election to the Executive Council may only be nominated with the approval of the member organization of his own country.

Article 27

(a) The President, the First and Second Vice-Presidents and the Treasurer shall serve for two-year terms.

(b) There is no limit on the re-election of the Treasurer.

(c) The six Ordinary Members of the Executive Council will be elected for four-year terms.

(d) If the date of a General Assembly does not coincide with the expiry of the term of office of several members of the Executive Council, the President may propose an extension of the term of office of all the members of the Executive Council by not more than 18 months, in order that the date of the next elections to the Executive Council may fall within the period of the General Assembly. This extension will become effective by postal approval of a simple majority of all members of IFAC. This procedure may not be used more than once between two General Assemblies.

(e) The President, the First and Second Vice-Presidents and the Ordinary Members of the Executive Council may not be re-elected to the same office until two years have elapsed since they last served as such.

(f) The Secretary and the Editor shall be appointed annually.

Article 28

(a) Should any member of the Executive Council other than the President, due to resignation, death or other cause, be prevented from fulfilling his duties, the Executive Council may, with the approval of his member organization, appoint someone to serve until the next election.

(b) Such a period of office shall not disqualify him from immediate election for a further term.

SECTION 6 - COMMITTEES

Article 29

(a) The Executive Council is assisted in its work by an Advisory Committee and is entitled to establish Technical and Special Committees in order to deal with special subjects.

(b) All services to IFAC of the members of the Advisory Committee, Technical Committees and Special Committees shall be voluntary and unpaid.

Article 30

(a) The Advisory Committee is international in nature and consists of not more than one representative from each member organization.

(b) The chairman and vice-chairman of the Advisory Committee shall be appointed by the Executive Council, in each case with the approval of the member organization of his own country. They may attend meetings of the Executive Council in an advisory capacity without the right to vote.

(c) It is the duty of the Advisory Committee to advise the Executive Council regarding the technical work of IFAC. It shall recommend formation of Technical and Special Committees as required, specifying their areas of work. It shall also recommend the chairmen and vice-chairmen of these Committees.

Article 31

(a) Such Technical and Special Committees as are deemed necessary and desirable may be formed by the Executive Council which shall appoint annually the chairmen and vice-chairmen for each committee with the concurrence in each case of his member organization. The terms of reference of each Technical and Special Committee shall also be set forth by the Executive Council.

(b) Although the Technical and Special Committees should be small, each member organization may recommend members to the chairmen of these committees. The members of each Technical and Special Committee shall, with the concurrence of the Advisory Committee, be selected by the Committee Chairman.

Article 32

(a) Each Technical Committee or Special Committee may invite other experts to offer temporary, voluntary, unpaid services.

(b) These experts, so invited, shall not be allowed to participate in the voting within the various committees.

SECTION 7 - FINANCE

Article 33

Member organizations shall be required to pay an annual subscription which will become due on January 2nd in each year.

Article 34

The subscription rates shall be as determined by the General Assembly.

Article 35

The revenue of IFAC shall be used for administrative and other expenses as directed by the Executive Council, which will be held responsible for such revenue to the General Assembly.

Article 36

(a) Each congress shall be held in a host country, where the inviting member organization will take the financial responsibility for the organization and conduct of the congress.

(b) The Executive Council may authorize such contributions as it thinks fit from the revenue of IFAC towards the expenses of any IFAC congress.

Article 37

The Executive Council shall have power to employ staff and to establish a reserve fund in the interest of IFAC.

Article 38

IFAC shall not be responsible for the expenses incurred by representatives of member organizations in attending meetings.

SECTION 8 - FINAL PROVISIONS

Article 39

A proposed amendment to the Constitution must have the support of at least one-third of the membership of IFAC or of at least five members of the Executive Council before it can be brought to a vote in the General Assembly.

Article 40

(a) Adoption of an amendment to the Constitution shall require a two-thirds majority of the total membership of IFAC.

(b) Votes on amendments cast by postal ballot will be considered valid.

Article 41

(a) The General Assembly may, subject to the general provisions of the present Constitution, adopt any By-Law that it deems necessary for achieving the aims and governing the activity of IFAC.

(b) Such By-Law shall be established or amended on a simple majority of votes cast by the General Assembly either by direct ballot or postal ballot, provided that at least thirty percent of the member organizations have voted.

Article 42

(a) Both the Constitution and the By-Laws are to be interpreted on the English text which is to be considered as the only official text.

Article 43

(a) The procedure for the dissolution of IFAC is the same as for amendments to the Constitution (Articles 39 and 40)

(b) In the event of the dissolution of IFAC the Executive Council shall determine the manner of disposal of the funds and properties for the benefit of any general utility, the aims of which are as similar to the aims of IFAC as possible.

B Y - L A W S

GENERAL PROVISIONS

No. 1

These By-Laws are drafted in accordance with Article 41 of the Constitution.

No. 2

The seat of IFAC is in Geneva, Switzerland.

GENERAL ASSEMBLY

No. 3

Each member organization shall, before the meeting of the General Assembly, designate the leader of its delegation, by whom alone the member organization's vote shall be cast, and communicate his name to the Secretary.

No. 4

(a) The date of a session of the General Assembly and the agenda therefore shall be fixed by the Executive Council taking into account the suggestions of member organizations.

(b) Notice of a session of the General Assembly shall be sent to member organizations by the Secretary not less than six months prior to the date fixed, accompanied by a provisional agenda.

(c) Comments on the agenda shall be returned to the Secretary not less than four months before the date of the Session.

(d) The final agenda shall be sent to member organizations not less than two months prior to the date of the Session.

No. 5

Matters not appearing on the agenda of a session of the General Assembly will be considered only if prior approval is given by not less than half of the member organizations represented at the General Assembly.

No. 6

(a) All requests for calling an extraordinary session of the General Assembly by member organizations shall be sent to the Secretary accompanied by a statement of the matter or

No. 6 (continued)

matters which they desire to be discussed, in accordance with the provisions of Article 10 (c) of the Constitution.

(b) The date of an extraordinary session of the General Assembly shall be fixed so that the session may take place within one year from receipt of the request by the Secretary.

No. 7

Any authorization by one member organization for a delegate of another member organization to vote on its behalf at a meeting of a General Assembly must be expressed in writing and lodged with the IFAC Secretary.

EXECUTIVE COUNCIL

No. 8

(a) The Executive Council shall reach decisions either at a meeting or by post on the basis of a simple majority of the votes cast.

(b) For a meeting of the Executive Council, a member may with the approval of his member organization appoint as his proxy another member of the Executive Council or another delegate of his own member organization to act in his stead. Notice of this proxy shall be sent to the President or the Secretary prior to the meeting.

No. 9

The Executive Council shall submit to the member organizations

(1) Nominations for the Executive Council
(2) Proposed date and place of the next session of the General Assembly
(3) Requests for recognition of new member organizations
(4) The Treasurer's report and statement of accounts of IFAC
(5) Proposed modifications to the Constitution or By-Laws of IFAC.

No. 10

The members of the Executive Council shall be elected during a session of the General Assembly or by postal ballot should the necessity arise between two sessions.

No. 11

In the case of elections to the Executive Council carried out during a session of the General Assembly the procedure shall be as follows:

No. 11 (continued)

(1) Preliminary lists of candidates for elections shall be prepared by an Election Committee consisting of three members from different countries appointed by the IFAC President, who also selects the chairman of the Election Committee.

(2) These preliminary lists of candidates, after approval by the Executive Council, shall be sent by the Secretary to all member organizations at least four months before the date fixed for the elections, inviting them to make additional nominations within one month.

(3) The final list of candidates, including the nominations from member organizations, shall be sent to all member organizations at least two months before the date of elections.

(4) The Election Committee shall supervise the operations of voting and count the ballots.

(5) The chairman or a member of the Election Committee shall report the results of voting.

No. 12

In the case of elections to the Executive Council carried out by postal ballot the procedure shall be as follows:

(1) The Executive Council shall submit its nominations to the member organizations and shall invite further nominations not later than four months before the date fixed for the elections.

(2) The final slate of candidates, including any nominations which may have been made by member organizations, shall be sent out to them not later than two months before the date of the elections.

(3) Only ballot papers received by the day fixed for the elections are valid.

(4) The IFAC Secretary shall be responsible for the postal ballot and shall report the results thereof.

No. 13

(a) The Secretary acts as secretary of the General Assembly as well as of the Executive Council and is charged with the implementation of the resolutions approved by each of these two bodies; he conducts the current business of IFAC, deals with correspondence and maintains the records of IFAC.

No. 13 (continued)

(b) The Secretary will act on matters in accord with decisions of the Executive Council except where clarification is required; in this event he shall obtain and follow the opinion of the President.

(c) The Secretary shall, taking into account the suggestions of the President and the other members of the Executive Council, prepare the agenda of each meeting of the Executive Council and post it two months before the date of the meeting.

(c) The Secretary may be paid or, as an Honorary Secretary, unpaid.

No. 14

The Editor may be paid or, as an Honorary Editor, unpaid.

No. 15

All documents committing IFAC in any way must be signed by two members of the Executive Council, one of whom should be the President and, if financial matters are involved, the other the Treasurer.

COMMITTEES

No. 16

The Special and Technical Committees shall report to the Executive Council through the chairman and vice-chairman and their functions shall include:

(1) Preparation of programs of activity of service in the field of automatic control on an international basis - included in this will be the preparations for Congresses and other special meetings.

(2) Preparation of periodic reviews of the technical state of the art in automatic control and associated fields.

FINANCE

No. 17

The financial year shall be the calendar year.

No. 18

Donations, legacies and grants can be accepted by authority of the Executive Council.

No. 19

(a) The subscriptions shall be fixed in several categories, each member organization having the free choice of the category in which it is willing to pay.

(b) This choice shall be made and communicated to the Treasurer before October 1st of each year for the subscription of the coming year.

(c) The categories of subscription are:

Category	Annual subscription USA Dollars
1	125
2	250
3	500
4	1000
5	2000

No. 20

The Treasurer will present annually to the Executive Council a report with a statement of accounts, duly audited, which will be transmitted to the member organizations.

No. 21

The Treasurer is authorized to administer the funds within the budgetary estimate as approved by the Executive Council.

Addendum – The IFAC Story 2014-2017

2015 - Chicago – Council Meeting

After the strategic planning activities that were a large part of Ian Craig's triennium as President there were numerous actions underway that were follow-through projects that would bring many of these plans into fruition.

The first phase of the IFAC history project was nearing completion with most of the IFAC Council minutes from IFAC's first 57 years having been scanned by the IFAC Secretariat staff and made available in a non-public folder on the IFAC website. This was a huge task involving some 150 sets of minutes in various formats, some of which were initially missing and some of which were in hardly legible form as paper copies had deteriorated. Some materials missing from the IFAC offices were obtained from some of IFAC's NMOs and some never were found. The IFAC History Task Force consisting of Stephen Kahne (Chair), Lennart Ljung, Janos Gertler, Vladimir Kucera, Sarah Spurgeon, Shinji Hara, Sergio Bittanti and Dongil "Dan" Cho held its first meeting in Chicago and would conduct essentially all of its work without further face to face meetings.

As part of the rebranding efforts of the past few years the new IFAC logo was in regular use and rules were being prepared that explained how the IFAC logo should be used. It had been observed that with all the NMOs using some version of the IFAC logo to announce various IFAC events in their countries, it was becoming difficult to maintain a consistent public image of IFAC world-wide. It was also important as part of the IFAC website reimaging efforts.

Nonlinear Analysis: Hybrid Systems was added to the IFAC family of journals under the agreement with Elsevier. This existing journal had been affiliated with the IFAC community for more than a decade.

Over the decades there has always been a concern about IFAC's fee structure for annual IFAC NMO membership. This was of particular significance during the period in which numerous IFAC national members were in countries that used

non-convertible currency. IFAC could not take such currency to pay the annual fees so several countries had to drop their memberships from time to time. A chart in this book tracks membership periods for more than 70 national societies several of which joined, dropped, and then rejoined IFAC as NMOs. During the strategic planning discussions it was decided to create some new membership fee levels that could be chosen under specified conditions and these were put into place during the triennium. It will probably take several years of experience before it can be determined if this new flexibility in fees has a positive impact on the IFAC membership situation.

The publications chapter of the book gives the complete history of IFAC's partnership with the IFAC Publisher. The control community had greatly benefitted from publications-related services provided by Papercept and in particular, Pradeep Misra, the company's owner. As a permanent archive of all IFAC technical meeting papers was being made available on the web in its data base "IFAC Papers on Line" through the services of this small company, it was finally decided to move this massive archive to the IFAC Publisher's data base. This change was to be made during the triennium and to end up with the entire IFAC archive of technical materials including journal articles as an integral part of Elsevier's Science Direct with full search and indexing provided.

The entire IFAC publications program is overseen by the IFAC Publications Committee that continually integrates IFAC's technical committees and technical activities with IFAC's publication. It is occasionally observed that there is a missing publications outlet that should be filled by a new journal or other type of publication. In 2015 it appeared that a wide-scope electronic journal of high quality would add a new and important channel for material that did not fit well into the existing IFAC journals. A task force was created to set up such a journal that would be known as the IFAC Journal on Systems and Control. During the triennial period this journal would be brought into fruition under the leadership of Robert Bitmead, to be its first Editor-in-Chief. Progress reports were to be given at each set of Council meetings as the journal evolved.

The number of IFAC technical events were forecast to remain at a high level for the coming years averaging more than 30 per year except for the Congress year as has been the IFAC tradition from its earliest days. In addition, other vehicles for exchange of technical ideas were being explored including a blog, You Tube channels, individual TC web sites available through the IFAC website, etc. Additional support for all these activities continued to be available from the Secretariat.

An IFAC Publications Ethics Committee was in place to deal with potential ethical violations such as plagiarism, simultaneous submission of papers for review, and inappropriate inclusion of listed references in an attempt to mislead reviewers or credit irrelevant prior journal paper listings.

An initiative to elevate the role of industrial contributors and industrial technical contributions in IFAC events and journals was established. Tariq Samad took the lead in this area. It would eventually lead to a new non-voting Council position.

Another initiative was to highlight contributions of young researchers under the age of 40 by creation of a new award – The Manfred Thoma Medal. The first presentation of this award was scheduled for the Toulouse Congress in 2017.

The IFAC Foundation, although not formally within the IFAC structure under jurisdiction of the Council, announced the creation of an award that was to highlight sustainability as an important theme for recognition by the control community.

2016 - Istanbul – Council Meeting

This was the meeting at which the triennial decision was made for the venue of the next World Congress and candidate for IFAC President. The finalists for the 2023 World Congress venue were Australia, Japan and the United States. Japan was selected with Hajime Asama as the proposed IFAC President for the 2020-2023 triennium.

In 2016 the plan to complete transfer of all IFAC technical publications to Elsevier's Science Direct was realized and as a result the lingering problems of full searchability of the data base were being resolved. The transfer project cost

turned out to be substantially less that had been originally estimated mostly due to lower scanning costs. With the IFAC archives being maintained on the Elsevier platform attention was drawn to the potential misuse of this valuable communication tool when dealing with co-sponsorship of IFAC technical meetings. It is one thing for IFAC and another society to fully co-sponsor a technical event. It is quite another when IFAC is asked to include its name but otherwise not be involved in paper reviews and quality control for a technical meeting. Lack of quality control is the main issue. Some experiments were proposed to more fully understand the implications of different experimental results. The TB was examining this matter very carefully.

Three NMOs chose the reduced-fee options for paying annual membership fees.

Progress continued to develop the new IFAC Journal of Systems and Control and it was anticipated that 2016 is the year in which it will be formally launched. A major contribution to be ready in time for the Toulouse Congress in 2017 is the "Control Research Agenda Report" to be made available as part of a special issue of the IFAC Journal – Annual Reviews in Control. The ARC Editor-in-Chief Francoise Lamnabhi-Lagarrigue has taken the lead in preparing this forward looking statement showing how systems and control are central to information and communications technologies in numerous applications domains.

Paper downloads from IFAC POL (being transitioned to Science Direct) continue at about 37,000 per year. It is expected that this number will increase as IFAC's social media activity is enlarged. Younger contributors tend to drive this use of social media in the research community. It has been observed that IFAC activities in the following technical fields need to be strengthened: cyber-physical systems, energy and sustainability, autonomous vehicle systems, social impact of control technologies, and sensors for automation. The Technical Board was reportedly working on these areas to ensure that IFAC plays an appropriate role in these areas. The 2016 Council has approved the proposal from the Awards Committee to install a Young Author Paper Award at all major IFAC events. The TB has taken over the implementation of this Award.

Continued progress on the IFAC Industry initiative was reported with a proposal for bylaws changes to include an ex-officio non-voting position for industry as an addition to the IFAC Council. The pilot study of the previous years would result in a new permanent industry position to be held by a Vice Chairman of the TB focused on industrial issues. Final approvals are required for the bylaws changes in Toulouse by the Council and finally the Generally Assembly.

Updates were given from the IFAC History Task Force stating that good progress is being made as originally planned. Chair of the Task Force, Stephen Kahne, reported that he expected the project would deliver at the Toulouse Congress the completed e-book tentatively entitled "The IFAC Story". There were some suggestions that the Congress would include one or more history sessions at least one of which would be based on the book contents. There were inconclusive discussions about follow-on history activities that should continue after 2017.

Francoise Lamnabhi-Lagarrigue reported on progress of the Research Agenda Task Force with planned completion of the report on this topic just before the IFAC Congress in 2017 so that one or more sessions at the Congress could be based on the final report of this committee.

Standard reports from PUMB and the IFAC Foundation were received as were updates about the Toulouse Congress planning progress.

2017 - Toulouse – Council Meeting

IFAC's activities continued to grow with over 18,000 participants in various IFAC events and leadership roles and 4500 affiliates during the triennium. Progress was reported on a number of strategic initiatives created during the past few years.

Experimentation with the Industry Committee pilot project was completed and new ByLaws were prepared for the General Assembly meeting during the Congress. The GA approved the new ByLaws. The decision was to create a permanent Industry Committee within the structure of the TB and to have the Chairman of this committee hold ex-officio non-voting rank on the IFAC Council. This will not affect the requirement of only one Council member from each NMO since that rule applies only to voting members of the Council.

As previously anticipated, IFAC's newest journal "IFAC Journal on Systems and Control" with Bob Bitmead as the founding Editor-in-Chief was on schedule to have its first issue available during 2017.

The PUMB contract with Elsevier was extended until 2026. This publication agreement has been in force since 1976. The latest addition to the publication program with Elsevier is IFAC Papers-on-Line (POL) with the TB now established as the editorial board of this proceedings-based publication. As the back log of proceedings papers is being added to the Science Direct data base several difficulties have been encountered related to copyright details of old volumes of conference papers. These are being addressed one at a time and completing the transfers remains a target for the coming year. Overall the IFAC publications program has been remarkably successful with about 70% of IFAC's annual income now due to publications activities.

IFAC's awards program continued to expand with 34 new IFAC Fellows being elected in the triennium. With a historical flavor at the Toulouse Congress, it was particularly noteworthy that Andrew Chestnut, son of IFAC's first President Harold Chestnut was in attendance to present the Harold Chestnut Textbook Prize to this year's winners.

The IFAC History Task Force completed its work when The IFAC Story, a history of the federation since its founding, was published as an e-book and made available on-line at the time of the Congress opening. A gift edition was distributed to a number of Congress attendees. The IFAC Story is permanently available on the IFAC web site.

96 technical events occurred in 25 countries during the triennium and an all-time high of paper downloads far exceeded previous triennial counts.

Some concern was expressed about the rigor of the peer review process for the Congress. The number of submitted papers for the Congress greatly exceeded the early estimates. It appeared that not all 4256 submitted Congress papers were subjected to an adequate number of reviews; it is getting harder to find qualified reviewers. Plans are being made to include young reviewer training to enlarge

the stable of reviewers in the future. It is planned that such reviewer training will be available at least triennially at subsequent Congresses.

The reduced fee membership categories seem to be successful with four of IFAC's NMOs now qualifying for their use. In an unrelated membership issue, Hong Kong IFAC membership was ended during the triennium.

The IFAC Foundation continued to help Congress organizers by supporting young authors. For the 2017 Congress 25 authors received financial help to attend the Congress and present their latest research results. Other contributions were made to the success of the Congress as is mentioned in the Toulouse Congress reports.

2017 - Toulouse – Congress

A 2017 Congress report may be found on the IFAC website in the August 2017 IFAC Newsletter.

The 20th IFAC World Congress in 2017 was the opportunity to celebrate the IFAC 60th anniversary. Together with the standard contributions from all areas covered by IFAC, the program featured highlights on the history of IFAC and history Automatic Control, on control education and outreach, as well as on control applications both in industry and in social system.

The plenary lectures presentations are available on the IFAC YouTube channel. The Congress attracted a total number of 4267 contributions, which include 98 Open Invited Tracks (with an average of 13 papers per track), 46 Invited Sessions of six papers, 30 Workshops and Tutorials, and 4093 papers.

The 2919 accepted contributions include: 1512 Contributed Papers, 1145 Papers submitted within Invited Sessions or Open Invited Tracks, 143 Extended Abstract Papers, 35 Invited Sessions, and 76 Open Invited Tracks.

The acceptance rate for Contributed Papers is 62%. It goes up to 72% for papers submitted to Open Invited Tracks, and up to 82% for those submitted to Invited Sessions. Overall, the acceptance rate of full papers with IFAC Copyright is 66.4%.

The final program included 2723 presentations organized in 389 sessions. Among these, 329 were oral podium sessions, 54 were oral interactive sessions with individual TV screens for each presentation, and 6 were demonstrator sessions.

There were a total of 8956 authors of papers in the Congress program from 83 countries. The total number of delegates is 3462 from 68 countries. The post Congress electronic survey was filled by 529 participants and showed a rather positive appreciation of the Congress program and organization.

Despite some complex security arrangements, the Congress was very successful and appreciated by participants from around the world, very much in the tradition of all IFAC Congresses during the past 60 years!

The IFAC Story

ISBN